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Building shared context and shared identity through communication

A qualitative study of interviews with Austrian and U.S. teams in the IT sector

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Kurzfassung

Teams mit flexiblen Arbeitsbedingungen gewinnen immer mehr an Bedeutung. Die damit verbundenen unterschiedlichen Arbeitszeiten und –orte haben allerdings zur Folge, dass die teaminterne Kommunikation komplexer wird. Aus der aktuellen Literatur geht hervor, dass Teams durch Bemühungen ihre Kommunikation zu verbessen, *shared context* und *shared identity* bilden können, was in weiterer Folge dabei hilft Konflikten und Missverständnissen vorzubeugen, das gegenseitige Verständings zu fördern, und die Zusammenarbeit zu verbessern. Ziel der vorliegenden Arbeit ist es daher, die folgende Frage zu beantworten: Inwiefern unterstützt Kommunikation die Bildung von *shared context* und *shared identity* in Teams mit flexiblen Arbeitsbedingungen? Eine qualitative Inhaltsanalyse von Interviews, die an zwei technischen Organisationen in Österreich und den USA durchgeführt wurden, wird präsentiert. Die Ergebnisse zeigen, dass Kommunikation die Bildung von *shared context* und *shared identity* auf drei Arten beeinflusst: (1) Sie bietet die nötige Plattform und Grundvoraussetzung, (2) bestimmte Kommunikationstools unterstützen die Bildung von *shared context* und *shared idenity*, und (3) gegenseitiges Kennenlernen fördert die Bildung von *shared context* and *shared identity*. Schlussendlich wurden Richtlinien aus den Ergebnissen abgeleitet, welche Teammitglieder unterstützen und die Bildung von *shared context* und *shared identity* vereinfachen sollen.

Abstract

Teams with flexible work arrangements are continuing to gain importance. The different working hours and places involved, however, lead to an increased complexity of communication within the teams. Literature suggests that by striving to improve communication, teams can build shared context and shared identity, which will help prevent conflicts and misunderstandings, promote mutual understanding, and lead to improved communication. The proposed research therefore strives to answer the following question: How does communication facilitate the development of shared context and shared identity in teams with flexible work arrangements? A qualitative content analysis of interviews conducted at software development teams in two technical organizations located in Austria and the USA is presented. The findings suggest that communication influences the development of shared context and shared identity in three ways: (1) it provides the necessary platform and precondition, (2) certain communication tools support the development of shared context and shared identity, and (3) shared context and shared identity are fostered by getting to know each other. Ultimately, guidelines were derived from the results, which are intended to support team members and make developing shared context and shared identity more achievable.

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1.   Introduction

New technologies are changing when, where, and with whom we work. Traditional offices have become a rarity and instead, an increasing number of organizations focus on flexibility and new Information and Communication Technology (ICT). They try to maximize their benefits of the virtual world by implementing geographically distributed teams. Those teams consist of people who are located at different offices, in different cities, or even different continents. Such work arrangements bring many advantages for employees as well as the organization, for instance reduced commute time and higher flexibility (Vos & Van der Voordt, 2001; Kurland & Bailey, 1999). Despite of such significant advantages, working with people you hardly ever see face-to-face, and maybe have never even met in person, also comes with a lot of new challenges. The reduced face-to-face contact makes it more difficult to develop trust and shared values (Kurland & Bailey, 1999). Coordination requires more attention and effort, and the number of conflicts increases (Hinds & Mortensen, 2005). Furthermore, when working with people from different countries, it might be more difficult to understand each other, not only because of language barriers, but also because of different customs and expectations (Olson & Olson, 2000; Kurland & Bailey, 1999). Cultural diversity thus often leads to increased communication complexity, resulting in miscommunication (Shachaf, 2008).

Most of the issues mentioned above are based on poor and insufficient communication between the dispersed team members. According to Te'eni (2001) the impact of communication are mutual understanding and relationship, which complies with the theory of Hinds and Mortensen (2005) who state that communication helps to develop shared context and shared identity. These theories are very important, because studies show that a strong shared context and shared identity can help geographically distributed teams to overcome their difficulties (e.g. Hinds & Bailey, 2003; Fussell & Krauss, 1992; Hinds & Mortensen, 2005).

The shared context describes all the knowledge, which communication partners in a certain situation possess, and all the information they both have access to, as well as all tools and physical surroundings they share (Brézillon & Pomerol, 1999; Hinds & Bailey, 2003; Hinds & Mortensen, 2005). For co-located team members it is, for instance, easy to point to something, or to gesture to strengthen their point. Most of the time they will automatically have access to the same tools and artifacts and are probably already familiar with each other (Olson & Olson, 2000). In geographically distributed teams all of this needs extra effort. However, it is important to make this effort because a shared context makes communication more efficient (Clark & Marshall, 1981), decreases the

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probability of misunderstandings (Cramton, 2001) and increases mutual understanding (Brézillon & Araujo, 2005).

Shared identity describes the attitude towards the team members and the *we-ness* (Cerulo, 1997) of the team. It leads to prosocial behavior and fosters trust and commitment (Kramer & Brewer, 1984; Swaab, Postmes, Van Beest & Spears, 2007). In addition, it helps to overcome interpersonal conflicts (Hinds & Mortensen, 2005), and to improve cooperation (Bos, Buyuktur, Olson, Olson & Voida, 2010).

Multiple studies show how beneficial shared context and shared identity for teams with flexible work arrangements are, but so far research lacks to explain how they are developed. Different researchers suggest that both are fostered by communication (e.g. Hinds & Mortensen, 2005), but they do not go into more detail. To be able to provide optimum support for geographically distributed teams, however, there is need for research on how shared context and shared identity are actually built. This research therefore focuses on the question how communication facilitates the development of shared context and shared identity in teams with flexible work arrangements.

To be able to draw conclusions interviews were conducted at two different companies in Austria and the USA. The intercultural setting was chosen in order to gain insights on the national influences on the development of shared context and shared identity through communication. The interviews were analyzed following the qualitative content analysis of Mayring (2008). Ultimately guidelines for future geographically distributed teams were derived from the results. They are intended to support and enable members of such teams and make developing shared context and shared identity more achievable, which will in turn improve their collaboration.

2.   Theoretical background

This section covers the literature research. As already mentioned in the introduction the focus of the thesis is on building shared context and shared identity through communication in geographically distributed teams. First of all, geographically distributed teams and their advantages and disadvantages will be discussed. In the second chapter the most popular communication theories and frameworks will be presented, because of the important role of communication for teamwork. Finally the terms shared context and shared identity will be defined and their relevance for geographically distributed teams will be discussed in detail.

2.1.   Geographically distributed teams

According to Kozlowski and Ilgen (2006) a team consists of at least two individuals who interact face-to-face or virtually. The team members are brought together by an organization and work towards a common goal. They have different tasks and responsibilities within the team and the organization provides the task environment and context for them.

Geographically distributed teams (GDTs) became possible only by the development of the information and communication technology and contribute significantly to the new ways of working. They have their origin in teleworking (Schaper, 2011), which can be seen as an "early form of virtual work" (Bailey & Kurland, 2002, p. 384).

Teleworking describes all work processes which are completed from a remote location, but where the teleworker is connected with her or his organization using ICT (Schaper, 2011; Johnson, Heimann & O'Neill, 2001). In 2002 the European Union signed a framework agreement on telework, which they define as

> a form of organising and/or performing work, using information technology, in the context of an employment contract/ relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises on a regular basis (European Social Partners, 2006, p. 15).

The framework stresses the voluntary character, and regulates employment conditions, data protection, privacy, equipment, health and safety, the organization of work, training, and collective rights issues. (European Social Partners, 2006).

2. Theoretical background

Many companies adapted the concept of teleworking, mainly to reduce costs, save office space and to expand the pool of possible employees (Kurland & Bailey, 1999). Naturally, the expectations of the organizations, which implement teleworking, are often very high. They aim at creating higher productivity through better ICT, more autonomy for the employees, a modern workplace design, and higher flexibility (Blok, Groensteijn & Van den Berg, 2011).

Employees with a flexible working arrangement will most likely experience greater autonomy (Vos & Van der Voordt, 2001; Kurland & Bailey, 1999; Gajendran & Harrison, 2007), higher flexibility (Schaper, 2011), and more freedom in the choice of workplace and time (Vos & Van der Voordt, 2001). However, higher performance pressure might be experienced (Schaper, 2011) and it becomes harder to access and maintain all relevant resources (Kurland & Bailey, 1999). On the upside, at home colleagues will not interrupt one, which leads to higher concentration. Interruptions by the family, on the other hand, can sometimes be just as distracting. Some studies report that teleworking makes the work-life balance easier (Gajendran & Harrison, 2007), while others point out that work and private live start to overlap and thus the employees might feel like they are never free and work for more hours (Vos & Van der Voordt, 2001; Kurland & Bailey, 1999). In addition there are fewer opportunities for informal communication. Consequently a lot of important information does not get shared (Vos & Van der Voordt, 2001) and less informal and spontaneous learning takes place. The reduced physical contact makes it harder to build trust (Kurland & Bailey, 1999) and the decay of social contacts makes teamwork more difficult (Challenger, 2000). As a consequence teleworkers often suffer from social and professional isolation (Vos & Van der Voordt, 2001; Kurland & Bailey, 1999; Gajendran & Joshi, 2012), which can have a bad impact on the productivity (Golden, Veiga & Dino, 2008). Gajendran and Joshi (2012) suggest that this isolation can be overcome through frequent leader-member communication and De Ridder (2004) reports that good communication can create a sense of belonging and foster the commitment and supportive attitude towards the organization.

Flexible work arrangements seem to have a positive influence on the physical health of the employees because they get more sleep, and are more likely to go to the doctor instead of coming to the office when they are sick, which helps them get better and prevents the spread of disease (Moen, Kelly, Tranby & Huang, 2011). Telework is also often said to increase job satisfaction, but there actually is not enough empirical evidence for this conclusion (Bailey & Kurland, 2002) because multiple studies showed that computer-mediated communication had a negative impact on the employee satisfaction (e.g. Baltes, Dickson, Sherman, Bauer & LaGanke, 2002).

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Martin and MacDonnell (2012) conducted a meta-analysis at the organizational level and reported that telework has a small, but positive influence on the organizational outcome and the performance within the organization. De Menezes and Kelliher (2011) also published a meta-analysis about the relationship between telework and performance. They acknowledge that multiple studies seem to show that flexible work arrangements indeed lead to a better performance, but also point out that there are almost as many studies that seem to prove otherwise. Baltes et al. (2002), for example, report that computer-mediated communication has a negative influence on group effectiveness. These different findings might be the result of different approaches and focuses of the studies. For instance definitions, the kind of flexible work, and the measurement all differ between the studies. Therefore no precise conclusions on the effect of flexible work arrangements on work performance can be drawn (De Menezes & Kelliher, 2011).

One big advantage of flexible work arrangements for employees, as well as society is the reduced commute time. Since it results in timesavings, and less traffic and pollution (Vos & Van der Voordt, 2001; Kurland & Bailey, 1999). Society might also profit from the easier and better integration of people with disabilities (Schaper, 2011). For organizations, more teleworking means providing less office and parking space, which results in significant savings. Organizations also appreciate the reduced sick leave (Vos & Van der Voordt, 2001), the bigger available talent pool (Kurland & Bailey, 1999), and higher flexibility (Schaper, 2011). Despite these and many other advantages, organizations also face certain challenges. For example, management and performance monitoring becomes more costly and complex, communication becomes more difficult, there is a higher need for coordination, and the organizational culture is harder to maintain. In addition data security becomes an issue (Kurland & Bailey, 1999; Schaper, 2011). So not all aspects of teleworking are positive. However, the trend seems to continue stronger than ever, probably because of success stories of major companies, such as Microsoft or IBM.

In the early 2000s Microsoft Netherlands suffered under insufficient office space. Thus, in 2008 they rebuilt their headquarter to encourage mobility, improve collaboration, and support employee engagement. No one, not even managers, have assigned desks, but there are different working areas equipped with the latest ICT and the employees are free to choose where they would like to sit down and work. This lead to reduced real estate costs of 30%, which equals to about $644,000 a year, reduced carbon emissions of 50%, greater collaboration, and increased mobility and satisfaction (Langhoff, 2010).

IBM also reports great success due to the new ways of working. Since 1995, they have significantly reduced their office space and were able to sell 58 million square feet for $1.9B. In addition they are renting out space they no longer need, summing up to $100M of annual savings just in the US, and about as much in Europe. At IBM, 40% of the employees worldwide have no office at all. They report savings of 17.2 billion kWh electricity and 5 million gallons of fuel in the US, between 1990 and 2005 (Caldow, 2009).

A study from Global Workplace Analytics (2015) shows that, in the US, the amount of people who regularly work from home has grown by 103% (Global Workplace Analytics, 2015) between 2005 and 2014. In 2014, 3.7 million US American employees worked from home at least half time, which represents 2.5% of the entire workforce (Global Workplace Analytics, 2015). In Austria, the number of teleworking employees almost tripled between 1999 and 2002 (Adam, 2007). Interestingly, the number of people working from home has been decreasing in Germany between 2008 and 2011 and has remained more or less constant ever since. The entire EU is experiencing a contrary development. Here, the number of people who are teleworking from home most of the time is increasing. The total percentage in 2014 was 3%. Within the EU, Austria has a high amount of regular teleworkers with about 6%, while Germany is close to the average with about 2% (Brenke, 2014).

Kurland and Bailey (1999) and Schaper (2011) differentiate between four forms of teleworking: home-based telecommuting, working from satellite offices, or neighborhood work centers and mobile work. What these four forms have in common, however,

> is a transition from in-person supervision to remote managing, from face-to-face communication to telecommunications-mediated communication, from on-site working to off-site or multiple-site working, and, in the case of groups, from side-by-side collaboration to virtual teamwork (Kurland & Bailey, 1999, p. 53).

As Johnson et al. (2001, p. 24) put it, "One of the fastest-growing, high-tech office trends today is 'virtual teams'. These teams cross time, space, and cultural boundaries and do so effectively with the use of technology". Virtual teams consist of employees who are not co-located, but work together as a team and use ICT to do so. The individual team members, might each be located in traditional offices, but they might also be teleworker, and can be part of multiple teams (Kurland & Bailey, 1999). Fiol and O'Conner (2005) criticize that such a definition only describes characteristics, which might be tendencies of virtual teams, but are not their true and defined traits. They therefore suggest the following distinction: "We define virtualness as the extent of face-to-face contact among team members (encompassing amount as well as frequency of contact) and suggest that technological

support and dispersion represent tendencies, rather than definitional attributes of virtual teams" (Fiol & O'Conner, 2005, p. 20).

Many authors use the term virtual team as a synonym for geographically distributed teams (e.g. Kurland & Bailey, 1999). Fiol and O'Conner (2005), however, make a distinction between virtual teams, which could technically still be co-located but communicating via ICT and actual GDTs, which are dispersed.

GDTs "consist of team members who are geographically dispersed and who come together by way of telecommunications technology (e.g., video conferencing)" (Kurland & Bailey, 1999, p. 56). According to Jarvenpaa and Leidner (1999, p. 809) GDTs are defined by three dimensions: "(1) no common past or future, (2) culturally diverse and geographically dispersed, and (3) communicating electronically". The members of GDTs are separated by time and space and in some cases have never once met face-to-face (Haywood, 2000; Kurland & Bailey, 1999). They work together to provide expert knowledge to their project and use ICT to overcome the distance between them (Johnson et al., 2001; Fang & Neufeld, 2006; Schaper, 2011).

The reasons for organizations to implement GDTs are closely related to the advantages of telework. Companies are trying to become more flexible concerning the employee's contracts, the working time, and location (Gibson, 2003). They anticipate improved business processes and expect to reduce costs (Matthewman, Rose & Hetherington, 2009; Johnson et al., 2001). A particular attractive feature of GDTs is that people on different continents, and therefore in different time zones, can work together as one team. This opens up opportunities to optimize human and material resources in a totally new way, widens the talent pool of possible employees for an organization and attracts top personnel from around the world (Johnson et al., 2001; Precup, O'Sullivan & Kathryn, 2006; Kurland & Bailey, 1999).

Despite of such significant advantages, being part of a virtual team also comes with new challenges. Johnson et al. (2001) describe the traits employees need to be successful in such a work environment.

- **Self-discipline:** In GDTs, the manager might be located at the other side of the world and cannot control every step and thus has to be able to rely on the team members.
- **Reliability:** In GDTs, it might not be noticed as quickly, if something did not get done, or was not done well. The team members therefore have to take more responsibility.
- **Flexibility:** The members of GDTs usually do not have any physical and personal contact with each other. Thus, it is very important that they stay open, sensible, and flexible.

- **Trust:** Without personal contact it is harder to build trust. The team members therefore have to put more effort into building it.
- **High communication skills:** Communication can sometimes be hard enough in person. Members of GDTs are faced with new challenges in this regard.

Konradt and Hertel (2002) describe four central aspects that characterize GDTs. These characteristics also point to the challenges team members, as well as the management of distributed teams, might face and are illustrated in Figure 1.

Figure 1: Central aspects for the distinction of virtual teams (adapted from Konradt & Hertel, 2002, and translated by the author)
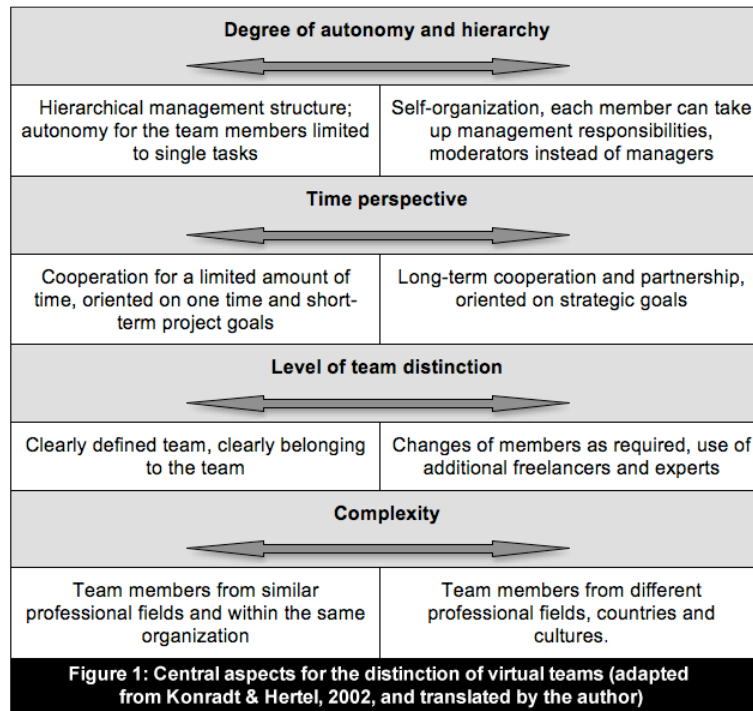
GDTs have become an important part of the new ways of working and a big trend across many industries (Fang & Neufeld, 2006), but they have proven to be especially effective in the IT sector, where the usage of ICT is naturally very high already (Schaper, 2011). In particular software development teams are often distributed, even though they have to work together closely because they have a great need for sharing information, discussions and decision-making. Furthermore their tools need to be compatible, which can sometimes be challenging (Araujo & Brézillon, 2004).

As discussed before, the term geographically distributed team is still a vague concept and different definitions focus on different aspects, including the reduced face-to-face contact, the increased heterogeneity of a team or the geographical distribution. Consequently, it is extremely difficult to scientifically evaluate GDTs and to achieve universal validity (Fiol & O'Conner, 2005). Some studies, however, show that it is harder to identify oneself with a virtual team because of the

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less present organizational identity (Kimball & Rheingold, 2000), which has a negative impact on the employee commitment and loyalty (Matthewman et al., 2009; Brézillon & Araujo, 2005). Cultural differences seem to be an additional challenge (Olson & Olson, 2000) and not only because of different languages. Kurland and Bailey (1999), for example, found in their study that European employees prefer to use more formal modes of communication, while US Americans prefer to use the opposite, which lead to frustration on both sides. Shachaf (2008) found that cultural diversity leads to increased communication complexity, resulting in miscommunication, and has therefore a negative influence on trust and the team identity. The reduced face-to-face contact makes it even harder to develop trust, shared values and a team identity, which can have a negative impact on the team performance (Kurland & Bailey, 1999). The old saying *out of sight, out of mind* proofs to be true again (Teasley, Covi, Krishnan & Olson, 2000).

Working in different time zones has certain advantages, because, if the work is distributed in the right way, it will result in more business hours. However, it definitely makes it harder for the team members to communicate on a regular basis (Haywood, 2000). Establising common ground is easier for co-located team members, because "they share not only cultural and local context, but also more microcontext of who is doing what at the moment and what remains to be done. Both awareness and more general familiarity make communication easier" (Olson & Olson, 2000, p. 161). Furthermore co-located team members usually automatically have access to the same tools and artefacts, while GDTs have to take a greater effort to achieve this (Olson & Olson, 2000). The greatest challenge for GDTs, however, seems to be overcoming communication problems (Precup et al., 2006). Cramton (2001), for example, reports an increased effort for keeping everybody on the same information level. Gould (1999) identifies three main categories of communication problems:

- **Lack of project visibility:** The team members did not always know how their tasks fit into the bigger picture and contributed to the whole project.
- **Availability and reliability:** Sometimes team members were not able to get hold of each other. They would send out questions, but did not get any answer.
- **Technological constraints:** It was sometimes hard for the team members to interpret the meaning of a written message, especially if it was meant sarcastically.

The insufficient communication and poor knowledge sharing between team members of GDTs lead to higher costs, more time required to finish a project (Precup et al., 2006), higher effort for coordination, and a higher number of conflicts (Hinds & Mortensen, 2005).

2.2.   Communication

In a meta-analysis Rice and Shook (1990) compared 40 studies of intra-organizational media use. They found that on a normal workday, people in organizations communicate for 73-81% of their time. Effective communication should thus be a primary goal for each organization. Communication is also a very popular research topic and studies show that for the right interpretation of the message it is not only important what we communicate, but also how and to whom (e.g. Greenaway, Wright, Willingham, Reynolds & Haslam, 2014). Over time, different communication theories and frameworks developed. The theories that are most relevant for this thesis will be discussed in the following sections.

2.2.1.   Communication media

For a very long time, the focus of communication research was on the sender's choice of media, with theories such as the access/quality approach, the media richness theory, and social presence theory. Even though Webster and Trevino (1995) noted that those theories are actually complementary and not mutually exclusive, the media richness theory received the greatest attention. The media richness theory was developed by Daft and Lengel in 1986 and, as the name already suggests, classifies communication media according to their richness. "Information richness is defined as the ability of information to change understanding within a time interval" (Daft & Lengel, 1986, p. 560). The richness of a medium depends on four characteristics: the "medium's capacity for immediate feedback, the number of cues and channels utilized, personalization, and language variety" (Daft & Lengel, 1986, p. 560). Therefore, face-to-face is ranked as the richest medium, followed by telephone, personal documents, impersonal written documents and numeric documents. The theory states that for effective communication the medium with the appropriate amount of richness has to be chosen in each unique communication situation (Daft & Lengel, 1986).

As already mentioned, the media richness theory has long been the most recognized and used media selection theory. Nevertheless, communication media has vastly changed over the last thirty years. The characteristics of newer forms of communication such as email, chat, and video conferences make it difficult to classify them according to the media richness theory. (Carlson & Davis, 1998; Fulk & Boyd, 1991). Email especially seems to make the biggest problems. Multiple studies show that it was successfully used for tasks, which according to the media richness theory would require a medium with a much higher level of richness, such as face-to-face (Carlson & Davis, 1998).

Another point of criticism is the fact that the assigned value of richness only depends on the medium and does not take the sender, receiver, or situation into account (Ngwenyama & Lee, 1997). Indeed, multiple studies showed that the media richness theory is not enough to explain media choice and communication (Webster & Trevino, 1995; El-Shinnawy & Markus, 1997; Carlson & Davis, 1998; Fulk & Boyd, 1991; Te'eni, 2001; Kraut, Rice, Cool & Fish, 1998).

Social interaction theories aim at addressing these issues, which the media richness theory does not seem to explain sufficiently. They are "based on the premise that organizations are webs of interaction, and the basis for interaction among members is a shared system of meaning" (Carlson & Davis, 1998, p. 340). The social interaction theory suggests that media choice is strongly influenced by external factors, like situational constraints, social interaction and organizational environment. Critics say, however, that social interaction theories only introduced additional variables with the intent to explain media choice, but were not able to structure or clarify the problem. Consequently, they have only made the topic even more complex (Carlson & Davis, 1998).

Dennis and Valacich (1999) were also looking to explain communication beyond the limitations of the media richness theory, and therefore introduced the theory of media synchronicity. According to their theory, communication effectiveness is a result of choosing the right medium for the right task and does not only depend on a context independent value of richness assigned to a certain medium. They define media synchronicity as "the extent to which individuals work together on the same activity at the same time; i.e., have a shared focus" (Dennis & Valacich, 1999, p. 5) and identify five physical media characteristics that affect communication, the so-called media capabilities:

- **Transmission velocity:** In the original introduction of the theory, this characteristic was called immediacy of feedback and described the extent, to which fast bi-directional communication is supported (Dennis & Valacich, 1999). In their later publication from 2008 it was defined as "the speed at which a medium can deliver a message to intended recipients" (Dennis, Fuller & Valacich, 2008, p. 584). High transmission velocity means that the message needs less time for transmission and thus reaches the recipient sooner. Thus an answer can be sent faster and continuous communication can be approached (Dennis et al., 2008).

- **Symbol variety:** This capability describes in how many different ways a message can be encoded for communication via the specific medium. (Dennis et al., 2008). The symbol variety corresponds to Daft and Lengel's (1986) number of cues and language variety. Depending on the symbol set, there are certain production costs and the set has an impact on the encoding and decoding time (Dennis et al., 2008).

- **Parallelism:** this describes "the extent to which signals from multiple senders can be transmitted over the medium simultaneously" (Dennis et al., 2008, p. 585) and, consequently, how many simultaneous conversations are possible. Traditional communication media, such as the phone, provide fewer possibilities for parallelism. With a chat, for example, one does not have to wait till a message is successfully transmitted, but can send a new one immediately (Dennis & Valacich, 1999).

- **Rehersability:** Rehearsability gives the sender the time to rehearse and adjust the message to make it as understandable as possible (Dennis et al., 2008). The rehersability therefore describes the ability of the medium to support this (Dennis & Valacich, 1999).

- **Reprocessability:** "The extent to which the medium enables a message to be reexamined or processed again, during decoding, either within the context of the communication event or after the event has passed" (Dennis et al., 2008, p. 587).

Obviously no single medium will score highest concerning all of these five characteristics, but Dennis and Valacich (1999, p. 3) point out that they do not have to. They conclude that "The 'richest' medium is that which best provides the set of capabilities needed by the situation: the individuals, task, and social context within which they interact". Thus, communication effectiveness comes from the right fit of media capabilities to the communication requirements of task at hand (Dennis & Valacich, 1999).

According to Dennis et al. (2008), shared understanding is the anticipated outcome of communication and therefore the participants have to aim at resolving equivocality. They suggest that two key processes can achieve this: "conveying information/deliberation and converging on a shared interpretation" (Dennis & Valacich, 1999, p. 4).

Conveyance processes are the transmission of new information, which enables the receiver to make sense of the situation. For this task, the communication partners do not have to agree on the meaning yet (Dennis & Valacich, 1999). Convergence processes are "the discussion of preprocessed information about each individual's interpretation of a situation, not the raw information itself" (Dennis et al., 2008, p. 580). Hence it is the development of a shared meaning and understanding (Dennis & Valacich, 1999). Conveyance requires less cognitive processing than convergence, which benefits from fast bidirectional information transmission (Dennis et al., 2008).

> Communication environments that support high immediacy of feedback and low parallelism encourage the synchronicity that is key to the convergence process. Communication environments that support low immediacy of feedback and high

parallelism provide the low synchronicity that is key to the conveyance/deliberation

process (Dennis & Valacich, 1999, p. 7).

Successful communication usually requires conveyance just as much as convergence because "without adequate conveyance of information, individuals will reach incorrect conclusions. Without adequate convergence on meaning, individuals cannot move forward to other activities as they will lack a shared understanding" (Dennis et al., 2008, p. 580).

Dennis et al. (2008) conclude that communication partners will always benefit from high synchronicity media, as well as from low synchronicity media. The more familiar people are with each other and the task, however, the less they need high synchronicity to achieve mutual understanding. Figure 2 shows a simplified illustration emphasizing aspects of the theory of media synchronicity relevant for this thesis.

Figure 2: Media synchronicity theory (adapted from Dennis, et al., 2008, by the author)
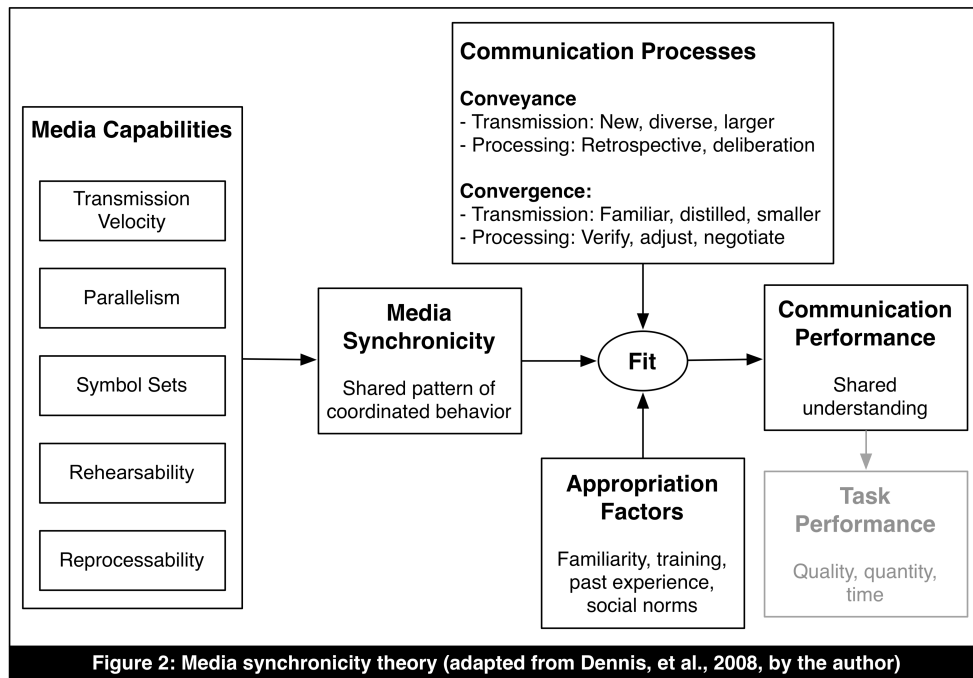
Even though the theory of media synchronicity represents an advancement over the media richness theory, it still focuses on the medium itself and does not explain the entire communication process. In the next chapter, a model will be discussed that aims at explaining the whole cognitive-affective process of communication (Te'eni, 2001).

2.2.2.   Communication process

Fulk (1993) states that a medium is not only an independent transmitter of a message but it also influences the message. Te'eni (2001) develops this idea further and notes that the choice of a medium is only partially important. It is also crucial to choose the right medium for the right communication purpose and the right message. A message in form of a letter might, for example, be perceived a lot more formal than the same message delivered orally or via text message.

According to Te'eni (2001), organizational communication should be regarded from three perspectives:

- **Action:** Every organization wants to achieve something and is thus interested in action. To accomplish any action communication is needed.
- **Relationship:** An organization will never stand-alone. There will always be social and economic exchanges, and they might even be the main focus of the organization. Therefore, communication is also needed to foster relationships.
- **Choice:** Every communicator has a choice of how to communicate.

Within these three perspectives, Te'eni (2001) developed a communication model that builds on the cognitive, as well as on the affective aspect of communication. It consists of the inputs to the communication process, a cognitive-affective process of communication, and the communication impact. These three elements are held together by the aim of reducing complexity, which is achieved by applying different communication strategies (Te'eni, 2001). The connection and relationship of these components is illustrated in Figure 3.

Figure 3: Cognitive-affective model of organizational communication (adopted from Te'eni, 2001, by the author)
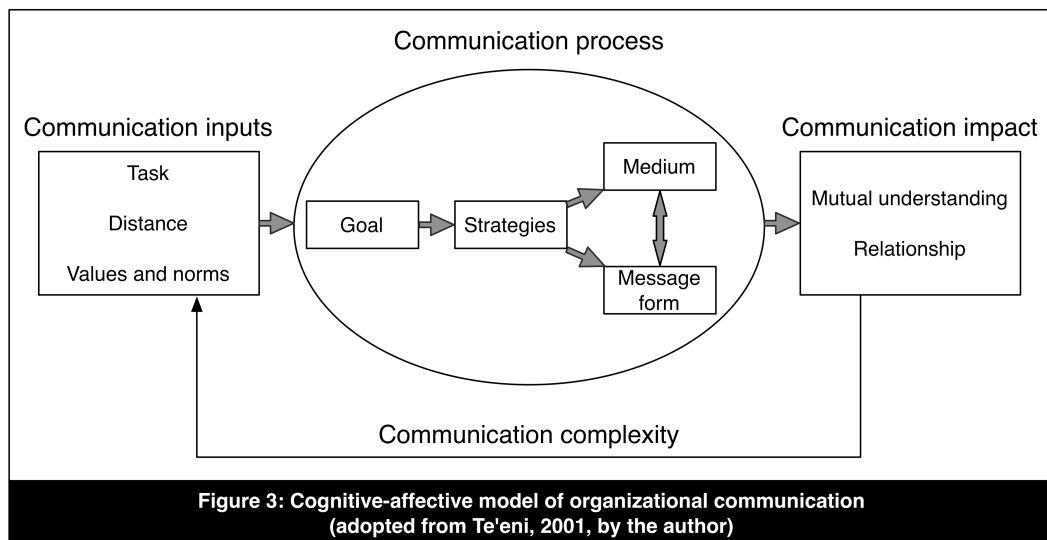
Te'eni presumes that communication can never be a process that stands alone. It will always be embedded in an environment full of additional factors. In the case of organizational communication, these factors are the individuals in the organization, the organizational and national culture, and the organization itself. The inputs to the communication process are thus characteristics of the task situation, sender/receiver distance and situation, and cultural values and norms (Te'eni, 2001).

Within the actual communication process Te'eni (2001) discusses the following elements:

- **Communication goal:** The communication goal describes what the sender intends to achieve by communicating. For example, instruct action, coordinate, and manage interdependent agents try to create and manage relationships between people, for example colleagues, or aim at influencing the behavior or attitude of the receiver.

- **Communication strategies:** The communication strategies describe the sender's method to overcome the communication complexity with the aim to achieve her or his communication goals. Possible strategies include: providing explicit context or affective components in messages, planning, testing, and adjusting communication as much as necessary, and trying to take the receiver's perspective and to manipulate the receiver's focus of attention.

- **Message form:** The message form describes the characteristics of the communicated information such as size, distribution, organization and formality.

- **Medium:** The medium describes the physical characteristics of the medium, which is used as a transmitter for the information. They are categorized in interactivity, channel capacity, and adaptiveness of a medium.

The impact of successful communication is always mutual understanding and a relationship between the sender and receiver (Te'eni, 2001). Mutual understanding can only be built, if the message is comprehensible and true, and "includes not only the receiver's understanding of the message, but also the sender's awareness that the recipient of the message has understood it" (Te'eni, 2001, p. 261). The building of a relationship requires trustworthiness and appropriateness, and is closely related to the building of mutual understanding (Te'eni, 2001).

As already mentioned, Te'eni (2001) considers complexity as inferring factor, which has to be overcome with the previously discussed communication strategies. Complexity can result from an overwhelming amount of information or incompatibility between multiple views (*cognitive complexity*), from changes during the communication process and limited time or feedback (*dynamic complexity*), or from sensitivity to attitudes (*affective complexity*) (Te'eni, 2001).

If the *cognitive complexity* and the *dynamic complexity* are very high, misunderstandings are more likely to occur. To prevent them more context information is needed. This however is not always a good solution, because higher contextualization leads to higher *cognitive complexity*. *Dynamic complexity* describes the time constraints and the feedback that the communication partners are exchanging. The *affective complexity* makes it more difficult to build a relationship because the ability to relate to each other and to sympathize with the communication partner will be disrupted (Te'eni, 2001). Te'eni (2001) therefore concludes that higher complexity makes it harder to build mutual understanding and relationships, which, in turn, means that a reduced complexity will lead to improved communication, which will than lead to higher mutual understanding and a better relationship.

2.3.   Shared context

The word context has its original meaning in language, as indicated by the word itself: "con (with) text" (Winograd, 2001, p. 403). Whenever people talk with each other, or produce written language, text is exchanged and context is needed. Without context the communication partner would not be able to understand the meaning of a word such as, *they*, or of a word with multiple meanings like *menu* or *table* (Kintsch, 1988). Furthermore, context is also needed to be able to interpret situations and to capture relations (Winograd, 2001). The context thus defines the who, when, where, what, why and how (Santoro & Brézillon, 2005) of a story. Ackerman (1996) applies this concept of context to written articles and therefore defines it as information about the author, the time and date of creation of the artifact, and the environment of creation (organization, country, etc.). Schwartz and Te'eni (2001) refer to this type of context as situational context.

Today the biggest issues in research concerning context are the many different ways context is used and all of the different concepts it is used to refer to (Brézillon, 1999). For example:

- **In communication**, the context describes the "history of all that occurred over a period of time, the overall state of knowledge of the participating agents at a given moment, and the small set of things they are expecting at that particular moment" (Brézillon & Pomerol, 1999, p. 236). Everybody has their own context, but it can be consistent with at least parts of someone else's context, which results in a shared knowledge space (Brézillon & Pomerol, 1999) with shared beliefs, where the people communicating understand each other (McCarthy, 1993).

- **In a cooperative environment,** the context refers to the interrelated conditions, for instance, the time and location, in which something or someone occurs or exists (Gross & Prinz, 2004).

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- **For engineers**, context describes all the setting of a situation and all the conditions that influence it that make it unique and that make it understandable (Brézillon, 2003).

- **"In the real world**, context is a complex description of the knowledge shared on physical, social, historical and other circumstances where actions or events happen" (Araujo, Santoro, Brézillon, Silva Borges & Da Rosa, 2004, p. 64).

Even though each of these definitions has its very own point of view, they all either mention context as the overall knowledge available in a situation (Brézillon & Pomerol, 1999), or as the circumstances, like the members, the location, the artifacts, applications (tools at hand) and environment, which identify a situation and make it unique (Gross & Prinz, 2004; Brézillon, 2003).

Hinds and Bailey (2003) state that a shared context simply exists, or does not exist. They refer to the physical context and the circumstances, for example a shared office, development standards, or an integrated development environment used by all team members, like Eclipse. This is in line with the definition of Hinds and Mortensen (2005, p. 293): "A shared context exists when team members have access to the same information and share the same tools, work processes, and work cultures".

Brézillon and Pomerol (1999, p. 230) on the other hand focus on the cognitive aspect of a shared context and define it as "the sum of all the knowledge possessed by the operators on the whole task". Consequently they described it as a dynamic concept, which is constantly changing and developing. Maskery and Meads (1992) agree with this view, because according to them context develops in the course of interaction between agents "as opposed to context as a fixed property of a particular problem or application domain. That is, without interacting agents, there would be no context" (Maskery & Meads, 1992, p. 14).

To some extent these two approaches have been built upon each other, because the physical surroundings and shared tools contribute to the knowledge possessed by communication partners. Especially with respect to teamwork a mental shared context and a physical shared context seem to be equally important and valid. Thus both will be discussed in the following chapter.

2.3.1. Formation of shared context

In a decision making process the mental context can be separated into three types of knowledge: external knowledge, contextual knowledge and proceduralized knowledge.

The external knowledge is knowledge, which is not relevant for the current situation and "has nothing to do with the current decision-making step but is known by many of those involved" (Brézillon & Pomerol, 1999, p. 229). It can also be seen as the environment (Maskery & Meads, 1992).

The contextual knowledge, sometimes also called individual context (Maskery & Meads, 1992), is a subset of the external knowledge, which is evoked by an event or task and relates to what is commonly referred to as *context*. It contains knowledge that is relevant for the current situation and therefore depends on the agent and the situation (Brézillon & Pomerol, 1999). "Contextual knowledge does not focus on a task or on the achievement of a goal but is mobilized" (Brézillon & Pomerol, 1999, p. 231). It is thus not explicitly used for problem solving, but is implicitly influential in the decision making process, for instance, as constraints of the reasoning process (Brézillon, 1999).

The contextual knowledge is specific to each agent, but might overlap with parts of the context of another agent (Maskery & Meads, 1992). Since the contextual knowledge represents all the relevant information in a current situation, it is theoretically speaking without limits (Brézillon & Pomerol, 1999; Santoro & Brézillon, 2005). It only exists in theory, however and is actually "implicit and latent, and is not usable unless a goal (or an intention) emerges" (Brézillon & Pomerol, 1999, p. 237). Such a goal, or intention might be an event that occurs, or a task that is defined. In this case the attention of the agent will focus and because of this focus, parts of the contextual knowledge will be organized, structured and moved back and forth between the contextual knowledge and the proceduralized knowledge (Brézillon & Pomerol, 1999; Santoro & Brézillon, 2005). Araujo et al. (2004) note that because of this constantly evolving process of knowledge transformation, context has to be seen as a dynamic concept within the scope of a task.

It can be said that contextual knowledge acts as a filter (Brézillon, 1999) and the focus of attention determines if there is any relevant information in the current situation and consequently which knowledge has to be considered. The context, in turn, guides and constrains the focus (Brézillon & Araujo, 2005; Brézillon, 1999) and provides the basis for expectations about what will happen next. (Grosz & Candace, 1986).

The proceduralized context is the part of the contextual knowledge, which has been activated and structured within the current focus to be able to understand the situation and make a decision (Brézillon & Pomerol, 1999). This can be described as the process of turning contextual knowledge "into some functional knowledge or causal and consequential reasoning" (Brézillon, 2003, p. 3). It contains all knowledge that has been discussed and made compatible by all agents, and in

the best case, has been accepted by all agents, as well (Brézillon & Pomerol, 1999). The proceduralized context can be considered "a contextualization of the contextual knowledge according to the focus and the practice developed for the focus" (Brézillon & Araujo, 2005, p. 5). That means it is related to a situation, location, agent, task, date and so on (Brézillon & Pomerol, 1999).

The proceduralized context therefore contains "knowledge that is shared by those involved in the problem and is directly, but tacitly used for the problem solving" (Brézillon & Pomerol, 1999, p. 229). Maskery and Meads (1992) already call this the shared context, or common ground, while Brézillon and Araujo (2005) describe one additional step in the process of developing a mental shared context. The proceduralized context describes the structured and organized knowledge that all the agents agreed upon and which they now use to reach a conclusion. It might contain new knowledge for an agent, which she or he gained because it had been made explicit by the other agent. The pieces of knowledge that have been discussed and that are mutually accepted become part of each agent's contextual context as soon as the focus of attention moves on and will thus stay available for retrieval. This part of the knowledge is called the shared context. It is thus a part of the contextual knowledge that has been proceduralized and was then transferred back into the contextual knowledge and therefore contains pieces of the proceduralized context.

The relation between the contextual knowledge, the proceduralized knowledge and the shared context is illustrated in Figure 4 and makes clear that knowledge transfer, or any kind of communication, can only be successful if the involved agents have a focus which allows them to develop a shared context (Santoro & Brézillon, 2005). The question that remains is how information can actually be proceduralized and then eventually transferred into a shared context.

Context develops in the course of a dialogue (Winograd, 2001) and multiple authors propose that explicity is a way of creating a shared context (Brézillon, 1999; Brézillon & Pomerol, 1999). By explaining something the communicators share their implicit knowledge with each other. In this process one's implicit knowledge becomes explicit and gives the communication partners the opportunity to ask questions and to understand, which leads to a shared context (Brézillon 1999; Karsenty & Brézillon 1995; McCarthy, 1993). Te'eni (2001) points out that context has to be provided in order for a message to be explicit, which indicates a bidirectional connectivity. Brézillon (2009) differentiates between five main categories of explanations: visual explanation, dynamic explanation, user-based explanation, micro- and macro-explanation and real-time explanation.

Figure 4: Different types of context (adapted from Brézillon & Pomerol, 1999; Brézillon & Araujo, 2005, by the author)
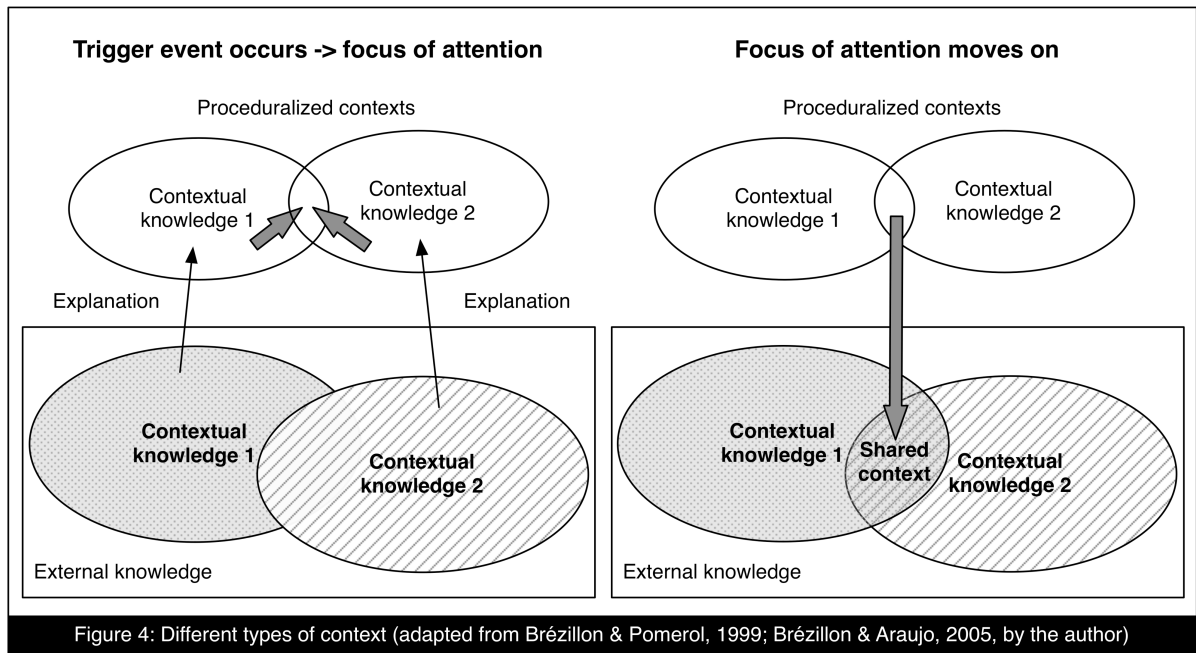
As straightforward as this might seem, in the daily life of an organization people often do not want to concern themselves with providing information, because it takes a lot of time and might not be the most interesting task (Santoro & Brézillon, 2005). Araujo and Brézillon (2004) point out that software development depends a lot on the developers *know how* and *know why*. Of course the developers have to communicate with each other, but a lot of the time only tacit knowledge is exchanged, which is knowledge that for "the most part relies on people's mind and is not registered in formal documents" (Santoro & Brézillon, 2005, p. 232). In order to be useful, not only for the communication partners but also the organization, this tacit knowledge has to be documented and organized. Otherwise it will be forgotten as soon as the project is over, or someone leaves the team (Santoro & Brézillon, 2005; Araujo & Brézillon, 2004).

As discussed above, context not only refers to knowledge, but also to the physical surroundings and the external circumstances (Brézillon, 1999; Hinds & Bailey, 2003). Consequently not only a mental shared context, but also a physical shared context is important for collaborative work.

> People's usable skills often depend on their physical settings because people act skillfully by using specific machines or tools, by interpreting physical cues, by exploiting their intimate knowledge of local idiosyncrasies, and by responding to stimuli embedded in a specific context. Seeing, touching, and manipulating are obviously important avenues for improving understanding, just as hearing and explaining are (Tyre & Hippel, 1997, p. 73).

This describes a different form of explicity, which is called awareness in the groupware research (Gross & Prinz, 2004).

Zack (1999) points out that, for example, the group context will be bigger than the individual context, but it does not mean that one contains the other because the individuals will bring information and knowledge with them that is not automatically part of the group context. However it is important to distinguish between these different contexts because they have to be managed differently. Rosa, Borges and Santoro (2003) describe five relevant elements for a shared group context:

- **Group and individual context:** Information about the group's composition and characteristics (abilities and experiences as a group, coordination, structure, etc.) and about the individual members of the group (abilities, location, experience, working hours, etc.).
- **Task context:** Information about the tasks, which the group have to take care of (name, goal, deadline, predicted effort, requirements, preconditions)
- **Relationship context:** Information about the relationship between the members of the group and the tasks and Information about the project plan.
- **Environmental context:** Information about the environment, where the interaction takes place (organizational issues, technical environment, quality control patterns, strategy rules, financial restrictions, etc.).
- **Historical context:** Information about previous interactions, tasks, projects and experiences learned. This information should be stored for future references.

2.3.2.   Significance of shared context

Extracting contextual knowledge can be difficult because people do not like spending too much time providing information. "They are also not motivated since organizational protocols have a tendency to be somewhat dry and lacking in inspiration" (Santoro & Brézillon, 2005, p. 233). This is a big issue because, as discussed below, research shows how important a shared context for a group really is.

Linguistic, and physical co-presence, both help creating a shared context and make interpersonal communication more efficient (Clark & Marshall, 1981). A shared context allows a "simultaneous view of global and local information" (Brézillon & Araujo, 2005, p. 553). Without a shared context it is harder to put oneself in the position of others (Fussell & Krauss, 1992) and the probability of misunderstandings increases (Cramton, 2001). Hinds and Mortensen (2005) found that without a shared context it is more difficult to develop shared norms, and therefore conflicts are

more likely. This leads to a lower team performance. Unbalanced information distribution in a team indicates that no shared context exists (Hinds & Mortensen, 2005). Unfortunately it is very hard to keep distributed team members on the same information level and most of the time they have different information without realizing it, which also creates potential for conflict (Cramton, 2001).

With a shared context, in turn, conflicts are not only less likely, but also easier to resolve and less likely to escalate (Hinds & Bailey, 2003). Furthermore the team members will have a higher level of mutual understanding, which increases the efficiency because everybody always has all the information necessary to perform a certain task. Thus the productivity will increase as well (Brézillon & Araujo, 2005). Teasley et al. (2000) found that physical proximity is important for spontaneous meetings and supporting each other, and leads to higher productivity. "The more common ground people can establish, the easier the communication, the greater the productivity" (Olson & Olson, 2000, p. 161).

Without a shared context it is harder to develop trust (Hinds & Mortensen, 2005) and face-to-face communication is very important for it (Hill, Bartol, Tesluk & Langa, 2009). Communication media, however, can help to build trust between dispersed team members. Bos, Olson, Gergle, Olson and Wright (2002), for example, showed that it is possible to built trust over chat, audio or video as well. However, it takes longer and the resulting trust will be more fragile.

Neufelder and Wan (2008) found that physical distance between the leader and worker had no effect on the perceived leader's performance, or the effectiveness of communication. Other studies showed that global teams performed worse than co-located teams, mainly because physical distribution makes the coordination of a team harder (McDonough, Kahn & Barczak, 2001; Teasley et al., 2000). Communication technology, however, might be able to overcome these difficulties. Belanger, Collins and Cheney (2001) showed that available communication technology has a positive effect on the perceived productivity and Akkirman and Harris (2005, p. 397) found that "virtual office workers were more satisfied with organization communication than traditional office workers". It can therefore be concluded that computer-mediated communication can help cross-cultural communication and leads to higher team effectiveness by providing a platform for a shared context (Aragon & Poon, 2010).

2.4. Shared identity

In a nutshell, shared identity describes the attitude towards the team members, the social dynamics in the team, and a sense of belonging (Kane, Argote & Levine, 2005) to the team. "Identification in

virtual organizational teams is thought to be especially desirable because it provides the glue that can promote group cohesion despite the relative lack of face-to-face interaction" (Fiol & O'Conner, 2005, p. 19).

Ellemers, De Gilder and Haslam, (2004, p. 436) state that "social identification is the process by which information about social groups is related to the self". Cerulo (1997) uses the term collective identity and defines it as the *we-ness* of a group, and thus uses the same wording as Koudenburg, Postmes and Gordijn (2013, p. 1), who define shared social identity as: "a feeling of we-ness in which a heightened sense of group entitativity, shared cognition and social identification are closely meshed".

Henry, Arrow and Carini (1999, p. 558) define group identification as "member identification with an interacting group" and state that it has three sources, namely "cognitive (social categorization), affective (interpersonal attraction), and behavioral (interdependence)". They distinguish the term group identification from social identity and group identity and propose that the term group identification should be used for individual-level processes, while the term group identity, together with the term corporate identity should be used "to refer to the distinctive identity of the group as a collective" (Henry et al., 1999, p. 561). Social identity, in turn, is defined as the "identification with broad social categories such as race and gender" (Henry et al., 1999, p. 561). Social identity is therefore an abstract concept, based on self-categorization. Self-categorization means that people reflect on the attributes that define a social category and based on, whether they share these attributes, they define themselves as members of this category. This leads to an in-group out-group distinction. Group identification however is an intragroup process where the individuals actually interact with each other and it does not need the regard of an out-group for them to identify with each other and the group. A musician e.g. may identify with her or his band, or orchestra without classifying everybody who is not a member as out-group (Henry et al., 1999).

Even though Henry et al. (1999) propose a precise distinction between the terms discussed above, they also note that many authors use all of them together with shared identity as synonyms (e.g. Swaab et al., 2007). This thesis follows the later approach and will treat the terms group identity and identification, social identity and identification, collective identity and identification as synonyms for shared identity.

2.4.1.   Formation of shared identity

A shared team identity is not a fixed state but a process and therefore "a dynamic property of a team" (Hinds & Mortensen, 2005, p. 292). It is produced by communication and can be changed and reproduced by it as well (Hardy, Lawrence & Grant, 2005; Kuhn & Nelson, 2002; Hinds & Mortensen, 2005). Traditionally shared identity formation is seen as a "top-down process in which a social identity is deduced from commonalities at a superordinate group or category level" (Jans, Postmes & Van der Zee, 2011, p. 1131). Shared identity is thus inferred by group members using knowledge about their group under the perspective of the wider social context in which they act. This approach is called deductive identity building. According to this theory social identity can be the result of a comparison with other social groups or categories, because it leads to a higher identification with the in-group (Swaab, Postmes & Spears, 2008). Postmes, Haslam and Swaab (2005a, p. 8) refer to this process as "(superordinate) group-level comparison". Common examples for such groups are political parties (Postmes, Spears, Lee & Novak, 2005b).

Nevertheless deductive identity building does not necessarily have to be the result of a comparison. It can also be inferred from an abstract feeling of togetherness developed through the "recognition of superordinate similarities" (Swaab et al., 2008, p. 167). Religious people, for instance, might identify strongly with their religious groups, completely irrespective of whether or not other religious groups exist (Swaab et al., 2008).

For a deductive identity the people in the group do not have to like each other "or recognize their similarities as individuals. Rather, members of such groups recognize and share a certain common attribute that is given meaning at a supra individual level and within an intergroup context" (Postmes et al., 2005b, p. 749). This shared attribute can for example be similar skin color, political views, a common interests, or membership of an organization (Postmes et al., 2005b). By highlighting these commonalities differences within the group are suppressed and members of the group are, to some extend, depersonalized. The shared identity thereby becomes an opposing factor of the personal and individual identity (Jans et al., 2011). Postmes et al. (2005a) disagree with this approach and thus propose the interactive model of identity formation illustrated in Figure 5. It suggests that there are two ways of building a shared identity, on the one hand the already discussed deductive approach and on the other hand an inductive approach, where shared identity is induced from the expression of individuality of group members. Communication thereby plays the role of an "interface between the individuality social identity" (Postmes et al., 2005a, p. 8).

Figure 5: Social identity formation (adapted from Postmes, et al., 2005a, by the author)
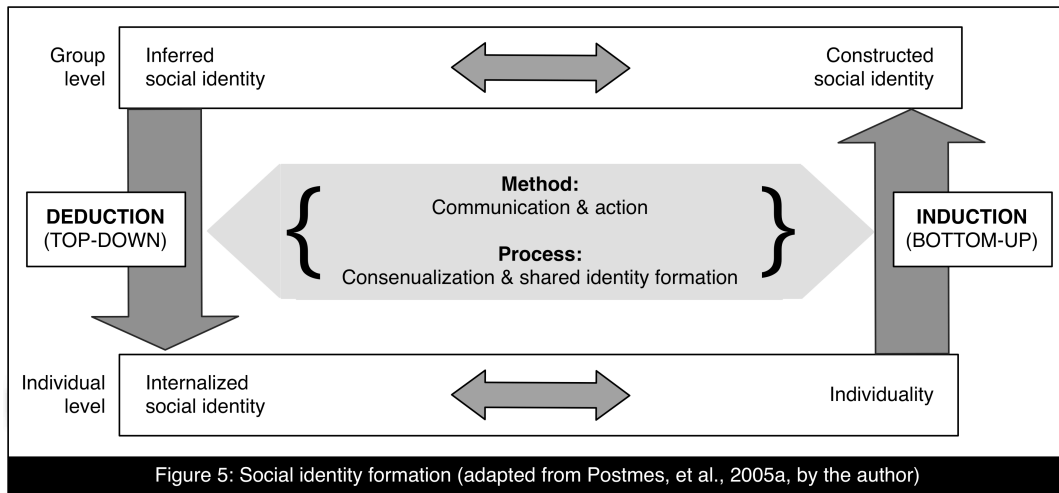
The inductive formation of a shared identity is a so-called bottom-up process because the individual distinctiveness of group members serves as its base (Postmes et al., 2005a). The shared identity is then formed by multiple different ways, for example by observing group members and engaging in discussions with them. That way individuals learn about the other group members and group characteristics (Postmes et al., 2005a; Swaab et al., 2008). The expression of individuality and its discussion and reconciliation, in turn, can lead to the establishment of new norms and strengthen the group (Swaab et al., 2008). Moreover under the atmosphere of mutual respect and good interpersonal relations the group members will most likely automatically adapt their behavior according to the others (Gaertner, Iuzzini, Witt & Oriña 2006), while the process becomes more difficult if the others are seen as out-group member (Postmes et al., 2005b).

An experiment of Jans et al. (2011, p. 1134) showed that group members who had the feeling that they could influence the shared identity, "they themselves felt more distinctive within the group. Moreover, their perceived distinctiveness helped them to perceive the group as an entity, which in turn helped them to identify with the group". Other authors, however, point out that the formation of an inductive shared identity does not necessarily depend on dissimilarities within the group, because "an inductive identity can derive from interpersonal similarities (which can be contrasted from the group-level similarities characterizing deductive identities) as well as from distinct individual contributions" (Postmes et al. 2005b, p. 749).

To sum up, individuality does not hinder the development of a shared identity and it is possible to be distinct and still identify with a group (Hornsey & Jetten, 2004; Postmes et al., 2005b). The key factor here is the interpersonal communication and relationship, therefore the group members have to be able to interact with each other, which is harder in larger groups. The bottom-up path of forming shared identity is thus especially relevant for small groups (Swaab et al., 2008;

Jans et al., 2011). Two common examples are a band which develops its own style of music which may then become a synonym for the band (Swaab et al., 2008), or fashion statements that turn into symbols for a social identity (Postmes et al., 2005a).

As Figure 5 shows, the key in both, the deductive and the inductive path, is communication, which "functions as the vehicle through which group members' interpersonal differences and commonalities, and the interpersonal relations that flow from them, can be translated into a concrete shared identity" (Swaab et al., 2008, p. 171). "In a sense, communication enables members of the group to translate an abstract idea of 'being in this together' into a concrete idea of what it is that 'we' are doing and striving for" (Postmes et al., 2005a, p. 10).

Also visualized in the interactive model of identity formation is that the deductive and inductive approach are not two distinct concepts, but both influence the formation of shared identity and that this process is grounded in individuality as well, as superordinate identity (Postmes et al., 2005b). In fact, a study from Swaab et al. (2008) shows that deductive and inductive processes are closely related and that they actually reinforce each other.

Postmes et al. (2005b) showed that members of groups with an inductive shared identity have a stronger individuality than members of groups with a deductive shared identity, where depersonalization can be observed more frequently. Nevertheless shared identity can be equally strong no matter if it was created over the deductive or inductive path, however, the contextual conditions are relevant.

## 2.4.2.		Significance of shared identity

A shared identity has a very positive impact on teams and influences many different aspects of the interpersonal behavior. First of all it leads to a prosocial and solicitous behavior and fosters trust and commitment (Kramer & Brewer, 1984; Swaab et al., 2007). Furthermore in an emergency an in-group member is more likely to be helped (Levine, Prosser, Evans & Reicher, 2005). Shared identity helps to overcome interpersonal conflicts and without shared identity people have less faith in their colleagues and are more likely to view others competitive instead of cooperative (Hinds & Mortensen, 2005; Hinds, Bailey 2003).

A study of Bos et al. (2010, p. 89) showed that groups with shared identity "did indeed coordinate work better, cooperated more, and were more willing and able to take on larger scale projects". This can be easily explained, because as Kimball and Rheingold (2000) point out, the

better we know people the more likely we are to share knowledge with them. Moreover knowledge of an in-group member receives more attention (Kane et al., 2005; Kane, 2010) and is more likely to be processed (Mackie, Worth & Asuncion, 1990). Intergroup communication, on the other hand, is often difficult and has a high potential for misunderstandings (Petronio, Ellemers, Giles & Gallois, 1998). Greenaway et al. (2014, p. 171) state that "a sense of shared identity between partners is a key determinant of effective communication" and show that not only the communication is more effective with an ingroup member, than an outgroup member, but the actual result (e.g. a collaborative produced product) as well (Greenaway et al., 2014).

While Greenaway et al. (2014) found that a shared identity does not have an impact on the motivation of the group members, Ellemers et al. (2004) showed that group identification increases the motivation to do something for the group and consequently for the organization. A study of Ouwerkerk, De Gilder and De Vries, (2000) might be able to explain these contradicting results. They showed that "stronger identification enhanced individual effort on behalf of the ingroup when people's social identity was threatened, whereas no such effect was obtained when the current standing of one's group was favorable" (Ouwerkerk et al., 2000, p. 1557).

2.5.   National influences and cultural backgrounds

"Global virtual teams (GVTs) are separated not only by space and time, but also often by culture. Cultural differences may be rooted in country-of-origin, organizational, and/or functional differences" (Massey, Hung, Montoya-Weiss & Ramesh, 2001, p. 207). Therefore it is very important to understand how culture and national differences influence different aspects of organizations and teamwork (Gelfand & Christakopoulou, 1999). Hofstede (1983, p. 76) describes the essence of culture as "collective mental programming: it is that part of our conditioning that we share with other members of our nation, region, or group but not with members of other nations, regions, or groups". Culture is the national character and imprint, which influences our communication behavior and our expectations when communicating with someone (Massey et al., 2001).

Hofstede (1983) identifies four dimensions that describe and categorize different cultures: (1) Individualism versus collectivism, (2) large or small power distance, (3) strong or weak uncertainty avoidance, and (4) masculinity versus femininity. According to Massey et al. (2001) the first three dimensions help to explain cultural differences in communication and are thus especially relevant for GDTs. Thus, they will be discussed in more detail.

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The individualism versus collectivism dimension describes the relationship between individuals. In individualistic cultures people like to be independent and to express their individuality (Shachaf, 2008). The ties between individuals are therefore rather loose and they have a great amount of freedom within the society. In collective cultures the ties between the ingroup members are very tight. They look out for each other and individual's opinions and believes are always in line with the group (Hofstede, 1983). These differences result in behavioral patterns, which can also be observed in cross-cultural teams. For example, working towards a common goal is something normal for collectivistic cultures, while members from individualistic cultures might be used to focus on their own goals instead (Brett & Okumura, 1998). Therefore teamwork comes more naturally to members of collectivistic cultures. Furthermore they might prefer richer, and especially synchronous, media, while people from individualistic cultures might prefer to be able to send short and direct messages (Massey et al., 2001). Negotiation studies with individualistic and collectivistic cultures also showed that mutual understanding is less likely in inter- than in intracultural settings, which was mainly due to the different levels of self-interest and the associated attention towards the own needs or the needs of all parties involved (Brett & Okumura, 1998; Gelfand & Christakopoulou, 1999). The USA, Canada and Great Britain are very individualistic cultures. Indonesia, Mexico and Greece are rather collective cultures. Austria, Germany and Finland are located more or less in the middle of the scale (Hofstede, 1983).

The large or small power distance dimension describes the different capabilities of people in a society. In some societies these differences are represented by power, wealth and social origin, in others they are less important. This is also reflected in organizational structures and relates to centralization of power and the level of autocratic leadership. Cultures with high individualism tend to have a small power distance, whereas cultures with low individualism tend to have a large power distance (Hofstede, 1983). The effects of these cultural norms can also be observed in teamwork. Aragon and Poon (2010), for example, describe in their study that a team of French and US scientists experienced difficulties in working together. The French culture is a high power society and the French team members did not ask any questions because they were expecting to be told what to do, while the team members from the US, a low power culture, expected that they would ask if something was unclear. This, of course, lead to misunderstandings in the team.

The strong or weak uncertainty avoidance dimension describes how society deals with the fact that the future is unknown. On the one end of the scale are societies that tend to accept this uncertainty, which are called cultures of weak uncertainty avoidance. People in such societies are more comfortable with taking risks, they might not work as hard and might be more tolerant of different behavior and opinions (Hofstede, 1983). On the other end of the scale are the so-called

strong uncertainty avoidance cultures, in which people are more anxious, nervous, emotional and aggressive. Such societies try to create security through technology, law or religion. Countries like Singapore and Jamaica have weak uncertainty avoidance. Austria, Germany, Canada and the USA are located in the middle of the scale and Portugal and Greece are examples for strong uncertainty avoidance cultures (Hofstede, 1983). In GDTs "variations in uncertainty avoidance may create differences in preferences for technologies in order to reduce ambiguity, allow for time to detail the task, or to create records of discussions and decisions" (Massey et al., 2001, p. 209). Because of their characteristics, synchronous media is preferred for reducing ambiguity, while asynchronous media is used to create records of the communication. It can thus be concluded that, the culture also influences which media is used to communicate and how it is used (Massey et al., 2001). In some organizations, for example, it is more common to chat with colleagues than in others. In such an open communication climate, people are more sensitive about what information others need to know and also remember to share it more easily (Kimball & Rheingold, 2000).

Culture not only influences the way individuals interact socially and the choice of media (Lee & Lee, 2009), but also the communication style. Hall (1976) introduced the so-called low/high-context framework, which categorizes different cultures based on their communication style as high- and low-context cultures.

> A high-context (HC) communication or message is one in which most of the information is either in the physical context or internalized in the person, while very little is in the coded, explicit, transmitted part of the message. A low-context (LC) communication is just the opposite; i.e., the mass of the information is vested in the explicit code (Hall, 1976, p. 91).

People from high-context cultures use and rely more on nonverbal cues, which is called context-dependent. For them it is usually important to spend some time to get to know a colleague than to get down to business right away (Zakaria & Cogburn, 2010). In high-context cultures information is shared rather freely and communication is considered a form of art. Consequently slow, indirect and emotional messages are appreciated (Hall, 1976) and a lot of the time additional information, like background or cultural knowledge, is necessary to understand them. Therefore personal contact and relationships are valued more (Pflug, 2011).

For people from low-context cultures, non-verbal language is not as important and they put more emphasis on spoken and written words. This approach is called content-dependant (Zakaria & Cogburn, 2010). They are also stricter about deadlines and tend to live according to the saying *time is money* (Zakaria & Cogburn, 2010). In low-context cultures information is less likely to be shared

and communication is rather task oriented. Thus fast, direct, and explicit messages are appreciated (Hall, 1976).

Hall (1976) points out that no culture uses exclusively high- or low-context communication, but that they can be classified according to their main communication style. According to Hall, Germany is at the far low end of the scale. The USA is only a little above, but still clearly within the range of low-context, while for example Japan and China are on the far high end of the context scale. In general, eastern countries have developed rather high-context cultures, while western cultures have developed low-context cultures (Pflug, 2011). "The level of context determines everything about the nature of the communication and is the foundation on which all subsequent behavior rests" (Hall, 1976, p. 92). Hall (1976) therefore suggests that that collaboration between high- and low-context cultures can be very difficult because the communication partners will have very different expectations and approaches and might simply not be able to read and understand the other person correctly.

Cardon (2008) points out that Hall's high vs. low context theory is the most cited framework about intercultural communication, but lacks some empirical evidence. He criticizes that Hall seems to describe high-context cultures in more positive words than low-context cultures and notes that Hall provided a ranking of low-context cultures to high-context-cultures, but did not explain how he collected, measured and operationalized this data. Consequently Cardon (2008) suggests that future researchers should reflect on the limitations of Hall's theory and review and validate it with further empirical studies. Park and Kim (2008) for example found that European-American college students use a more direct and open communication style than their Asian-American colleagues. Shachaf (2008) presents similar results from a study in GDTs and describes how frustrating the collaboration was for the American team members who were waiting for a clear response from their Asian colleagues. The German and Japanese team members, on the other hand, were frustrated because the English language does not provide the social structure they are used to, and felt uncomfortable having to use a more personal communication style. Richardson and Smith (2007) replicated the findings that the USA is a low-context culture and Japan is a high-context culture and point out that the lack of nonverbal social cues in computer-mediated communication must be more difficult to handle for people from high-context cultures than from low-context cultures. Following this line of argument, Massey et al. (2001) add that people from high-context cultures probably prefer rich communication media with a high social presence, while people from low-context cultures might prefer fast and efficient task oriented communication media. Pflug (2011) analyzed Internet forums and showed that Indian users share private information more freely and use more emoticons than

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German users and therefore suggests that Hall's theory is also valid for computer-mediated communication.

All these different preferences, communication styles, and expectations lead to many misunderstandings and make it harder to work together in a cross-cultural setting. However, as already mentioned, a shared context and shared identity can help to overcome such difficulties. The empirical research of this thesis thus focuses on the development of shared context and shared identity.

3.   Empirical research

As discussed in the previous chapter, shared context and shared identity have a positive impact on teams by helping them overcome difficulties and improve their collaboration. Therefore it should be the goal of every team to build a strong shared context and shared identity and for every supervisor to foster both. Literature so far only states that communication helps this process, but fails to explain the exact procedure. This issue is addressed by the first research question:

Research Question 1: How does communication facilitate the development of shared context and shared identity in teams with flexible work arrangements?

As discussed before, geographically distributed teams often experiences difficulties because of their heterogeneity, which makes it harder to collaborate. Only if people are aware of differences they can work together to overcome them. Thus the second research question aims at the impact of nationality and culture on the creation of shared context and shared identity.

Research Question 2: Which differences exist between the Austrian and the U.S. teams when developing shared context and shared identity through communication?

Austria and the USA were selected to be able to analyze differences in the creation of shared context and shared identity in a reasonable way because the two cultures are different, but not in so many ways that it would be distracting from the actual subject. For example, both the USA and Austria belong to the western culture (O'Hara-Devereaux & Johansen, 1994), but people from the USA have a more task oriented perspective while Europeans might value personal relationships more (Olson & Olson, 2000).

To be able to answer these research questions, interviews in four offices of two organizations in the USA and in Austria have been conducted, transcribed and analyzed. In the following chapters the methodological approach will be discussed and the two organizations introduced. Afterwards the research process will be documented and described in detail.

3.1.   Methodological approach

Interviews allow the researcher to ask questions, to discuss individual interpretations and motives for action. It is very important to use the right interview technique for the relevant research question. Interviews can have predefined questions with a fixed order, or can be very open with only a few given questions. Most of the time an approach between those two extremes is chosen, which is called a semi-structured interview. The researcher thereby follows an interview guideline, but has a lot of freedom to change questions, or their order, and to ask for more detailed information (Hopf, 2012).

The nature of the two research questions required an explorative approach to acquire new knowledge and to be able to generate new hypotheses. Consequently semi-structured interviews with open questions were conducted. The questions were derived from literature and addressed the topics of the research questions. Later on the interviews were transcribed which naturally resulted in a text-based transcript. The *qualitative content analysis* (Qualitative Inhaltsanalyse) was chosen to evaluate and interpret the transcript. It is based on hermeneutic methods and supports a rule-based evaluation of interviews (Krüger & Riemeier, 2014). It is furthermore a typical approach for qualitative research and aims at the development of hypotheses and the generation of new theories (Mayring, 2008).

The qualitative content analysis was developed by Philip Mayring and is a process of systematic and rule-governed interpretation of a text (Ramsenthaler, 2013). The goal of the qualitative content analysis is to analyze material that resulted from any form of communication. The systematic, rule-based and theory-based approach is essential in this process and allows drawing conclusions about certain communication aspects. The idea is thus to summarize a text in a specific way, so that it will eventually be reduced into certain categories, which then allow a replicable and transparent analysis and interpretation (Mayring, 2008).

The qualitative content analysis has sometimes been criticized because it is not purely inductive and it does not take individual cases into consideration. However it is a rule-governed system that enables the researcher to induct categories from the material and is therefore an often used and established approach (Ramsenthaler, 2013). It assures an intersubjective comprehensible system by fulfilling the following three quality criteria: objectivity, validity and reliability (Mayring, 2008).

3.2.   Qualitative content analysis

As already mentioned, the qualitative content analysis from Mayring (2008) was chosen to analyze the result of the conducted interviews. Mayring (2008) defines guidelines for a step-by-step analysis and uses a very specific terminology. The German expressions are therefore provided as well:

1. *Specifying the material* (Festlegung des Materials)
2. *Analysis of the originating situation* (Analyse der Entstehungssituation)
3. *Formal characteristics of the material* (Formale Charakteristika des Materials)
4. *Direction of the analysis* (Richtung der Analyse)
5. *Theory based differentiation of the research question* (Theoriegeleitete Differenzierung der Fragestellung)
6. *Process model of the analysis* (Ablaufmodell der Analyse)

The following chapters describe and discuss the implementation of these analytical steps.

3.2.1.   Specifying the material

The first step in the qualitative content analysis is to define the data material. For the transparency of the research process it is important to describe how and where the data was collected and which part of it will be used for the research and thus analyzed (Mayring, 2008; Brézillon & Pomerol, 1999). As already mentioned, distributed teams are widely used in the IT sector and especially in software development. The interviews were thus conducted in software development teams of two organizations with technical and engineering focus. To ensure comparability both companies have office locations in Vienna and the USA, but their historical roots and their current headquarters are in German-speaking countries.

A total of 20 interviews were conducted on four separate occasions between February and May 2015. Data gathering took place in two international organizations, which both have an office location in Austria and in the USA respectively. In February, ten interviews were conducted in Vienna (Austria), five at each organization. In March five interviews were conducted in Princeton (USA) at one organization, and in May five in Seattle (USA) at the other organization.

In both organizations participants were reached through personal acquaintances of the author. They were asked to recruit a representative sample of the employees of the organization with divergent tasks within the software sector.

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The following criteria had to be met:

- Each participant has to be part of a team.
- The participants have to be part of a flexible work arrangement. Therefore each participant has to have the possibility to work from home for a few hours a week and has to have at least one remote team colleague.
- The five people in each organization have to belong to two, or three different teams.
- The participants have to be fluent in either German or English.

At each office location only one female employee was interviewed and most of the interview partners were under 45 years old. In the USA, however, the average age of the participants was higher than those of the Austrian locations. At the first and fourth interview location the five participants were members of two different teams. At the second and third location they were in three different teams. At all four interview locations, the teams included six men on average. However, at the two office locations of organization 1, on average, less than one woman was in each team, while organization 2 had approximately two women.

PID	Anonymized name	Organization	Ctry	Team	Position	Age	Gender
1	Stephanie	1	AT	1	Software architect	25-35	F
2	Manuel	1	AT	2	Technical project manager	36-45	M
3	Li	1	AT	2	Software architect	25-35	M
4	Lukas	1	AT	2	Software developer	36-45	M
5	Peter	1	AT	2	Data mining	25-35	M
6	Kevin	2	AT	3	Database, testing	25-35	M
7	Jeffrey	2	AT	4	Software quality manager	46-55	M
8	Walter	2	AT	4	Scrum master, developer	25-35	M
9	Christian	2	AT	4	Software developer	25-35	M
10	Nele	2	AT	5	Technical writer	46-55	F
11	Shakuntala	1	USA	6	Scrum master	46-55	F
12	Frank	1	USA	8	Software architect	25-35	M
13	Madhukar	1	USA	7	Software developer	36-45	M
14	Alexander	1	USA	6	Software architect	46-55	M
15	Lal	1	USA	6	Technical project manager	> 55	M
16	Will	2	USA	9	Technical writer	36-45	M
17	Roland	2	USA	9	Software developer	> 55	M
18	Anna	2	USA	10	Software build engineer	> 55	F
19	Dan	2	USA	10	Software quality manager	25-35	M
20	Geoffrey	2	USA	9	Software developer	46-55	M
Table 1: Composition of the interview participants							

At each location the interview partners occupied a lot of different IT positions like QA testers, build/infrastructure engineers, documentation writers, scrum masters, and developers. Table 1 gives an overview of the composition and positions of the participants. On average the participants

in Austria have been working for their organization for six years, while the participants in the USA have been working for their organization for about ten years.

Even though the demographic data of the participants is not very balanced, the sample largely represents the demographics of technical companies (Mangalindan, 2014) and especially of the studied organizations and is thus representative for the focus of this research.

The main unit of data for the qualitative content analysis is the 195 pages long transcript of the 20 interviews. All paragraphs that help answering the research questions about shared context, shared identity and the differences between the Austrian and the U.S. teams were selected and used for the analysis.

3.2.2.   Analysis of the originating situation

All participants volunteered to take part in the study and to answer the interview questions. They were not compensated for their time and to ensure that they would not be biased and influenced by presuppositions or assumptions about the topic of research, they were simply told that the project was about team communication.

The interviews were based on a semi-structured interview protocol, which asked about communication habits and dynamics in IT teams. Depending on the course of the interview, the questions and their order were slightly modified. Each participant answered all questions and the interviewer took the freedom to inquire for more details, if necessary. The interviews took place in meeting rooms in each respective organization and country. Everyone has their own way of asking questions and interacting with people, which can affect the interview answers. Therefore, the author conducted all interviews herself, in order to prevent bias. A special emphasis was placed on creating a pleasant atmosphere for conversation by short small talk before the interview and a small gift (chocolate bar) for each participant.

The interviews were specifically conducted to collect data for this thesis, but it might now be used for further research. The two organizations had no direct benefit from taking place in the study, but their help was greatly appreciated.

3.2.3.   Formal characteristics of the material

Each interview lasted between half an hour to an hour. All interviews were recorded and then transcribed manually using Microsoft word and an audio player. This resulted in a text of ten pages per interview on average, and 195 pages all together.

The author transcribed all interviews, and because the data might be used for further research, the rules for transcription proposed by Mayring (2008) were modified to receive an even more accurate transcript. The following rules were used for the transcription process:

- The speaker has to be labeled either "Interviewer", or "Respondent".
- Each independent question of the interviewer has to be written down in a new column with a time stamp and each answer respectively. If it is a short follow up question, or the respondent interrupted the interviewer than the paragraph will be placed in the same column.
- The transcript has to be complete and literal.
- Dialects and imprecise articulation are to be ignored and the proper German or English word has to be used instead.
- If a word or a phrase cannot be understood "[incomprehensible]" has to be used instead.
- A break in the conversation has to be marked as dots in brackets, with one dot for each second of the break. A hesitation in the flow of conversation counts as a break, if it is longer than three seconds, e.g. (....).
- Non-verbal expressions have to be noted in square brackets, e.g. [laughs].
- Situation specific sounds have to be noted in square brackets as well
- Filler words, or words to demonstrate listening are part of the text.
- A hyphen marks an interruption of a word or sentence.
- The names of the organizations have to be replaced by "[organization 1]" and "[organization 2]" respectively.

All interviews were anonymized and names of people, projects, or locations were substituted with new names that indicated their demographics or nature, but do not give any conclusion as to who, what, or where the original person, project or location was. Eleven Interviews were conducted in English and nine in German, because one participant at the first interview location in Austria preferred to answer in English, since his first language was not German. Since neither German nor English are the native language of all participants sometimes it was necessary to rephrase a question and ask again and not all sentences are in perfect English or German. Nevertheless everything was transcribed without corrections to ensure that the data set is complete. References that are used in the text of the thesis, however, have been cleaned from filler words and incomplete sentences have

been completed, in order to improve readability. Table 2 shows a small extract of the transcribed interviews and serves as example of the way the transcription rules were applied.

Time stamp	Questions and Answers
00:15:26	**Interviewer** Mhm. Do you feel the team is more a group of people that the management put together, or is there kind of a team spirit?
00:15:36	**Respondent** *Ahm* (……) I feel – well in Austria I think this is team spirit. I think *ahh*, you know, I know everything they are doing over there and identify with it, so I feel like I'm a part of the team. But the reality is – is that *ahm* I was put into that team. I mean, because they wouldn't have met me otherwise [laughs] So I don't – I don't have a negative feeling about it. Here it is a bit more *ahh ahm* (….) people came together because they worked together for a long time. And there is some areas where they have a team spirit and there is some areas where they – it is not enough of a team spirit
00:16:24	**Interviewer** What do you think makes the difference?
00:16:27	**Respondent** The – the manager has to have the mindset that this is a team – we are all a team and making – be making sure that it runs as a team, having group meetings, outings together. *Ahh* the manager should be going around, talking to people, making sure that – finding out what is going on and – and making sure that, you know, things are moving here. You are leading an army to do this battle and so you have to *ahh* know all your man in the army, make sure they are fed, they have cloth, they know what the mission is, they are all working together, they are skilled, whatever.
00:17:07	**Interviewer** Can you think of a moment where you felt most connected with your team?
00:17:11	**Respondent** Most connected. *Ahm* (….) I feel the connection in Austria is stronger. Even though *ahm* I don't work over there I think *ahh* – it is more connected. They work together and they talk together, they go out to eat together, have a beer together.
Table 2: Example for the applied transcription rules taken from the interview with participant 18	

3.2.4.   Direction of the analysis

Depending on the focus, a text analysis can lead to multiple different results. Consequently it is important to define the researcher's interest and goal beforehand (Mayring, 2008). This research project is positioned within the framework of communication in teams of international organizations. The interviews were meant to encourage the participants to talk about their feeling as a member of the respective team, their own actions and ideas, and experiences about communication in their team. The aim of the analysis is to formulate statements about the emotions, cognitions, motives and actions of the team members related to shared context and shared identity.

3.2.5.   Theory based differentiation of the research question

The theory-driven interpretation is one of the major characteristics of qualitative content analysis. It is therefore very important that the analysis is based on theoretically founded research questions

(Mayring, 2008). Multiple qualitative researchers have criticized this theory-driven approach, as theories can narrow the perspective and distort the data. Nevertheless, Mayring (2008) claims that if a theory is seen as the combined knowledge of a topic of interest, then it is nothing but the accumulated experiences about it. A theory-driven approach thus builds on this combined knowledge to lead to new results and insights.

As previously mentioned, the following two research questions were derived from the literature, which has already been discussed in the chapter on theoretical background.

Research Question 1: How does communication facilitate the development of shared context and shared identity in teams with flexible work arrangements?

Research Question 2: Which differences exist between the Austrian and the U.S. teams when developing shared context and shared identity through communication?

Both questions are heavily based on findings from Hinds and Mortensen (2005), which suggest that shared context and shared identity are developed through communication. These assumptions are substantiated by multiple studies (e.g. Hardy et al., 2005; Kuhn & Nelson, 2002) and are theoretically supported by the cognitive-affective model of organizational communication by Te'eni (2001), which defines relationship and mutual understanding as the outcome of communication. The second question further builds on multiple studies that report difficulties in geographically distributed teams based on their physical location or cultural heterogeneity (e.g. Fiol & O'Conner, 2005; Matthewman et al., 2009; Brézillon & Araujo, 2005; Cramton, 2001; McDonough et al., 2001; Teasley et al., 2000).

For the analysis the two main research questions will be divided into the following sub questions:

- **RQ1a:** Does communication facilitate the development of a shared context in teams with flexible work arrangement? If yes, how?
- **RQ1b**: Does communication facilitate the development of shared identity in teams with flexible work arrangement? If yes, how?
- **RQ2a**: Are there differences between the Austrian and the U.S. teams when developing a shared context? If yes, which?
- **RQ2b:** Are there differences between the Austrian and the U.S. teams when developing shared identity? If yes, which?

3.2.6.   Process model of the analysis

The process model assures that the analysis follows predefined steps, which makes it transparent and verifiable. Therefore it becomes applicable for further research and usable for others (Mayring, 2008). According to Mayring (2008) different kinds of interpretation are possible, but the researcher has to assure that the chosen approach is the right one for the data at hand. He differentiates between three basic forms of interpretation:

- **_Summary_ (Zusammenfassung):** The text is reduced in a way where the essential content is included and then concentrated onto a more abstract level, still representing the basic material.

- **_Explication_ (Explikation):** Additional material is collected to explain, outline and interpret the relevant text passage (word, sentence, etc.). Depending on the material that is used for the explanation either a narrow context analysis (enge Kontextanalyse) or broad context analysis (weite Kontextanalyse) is used.

- **_Structuring_ (Strukturierung):** Information is extracted from the text according to previously defined criteria. Based on this filtered information the material is assessed.

The aim of this research is to extract information about shared context and shared identity from the interviews, and not to combine the interviews to a bigger picture, or to use additional material to explain certain text passages. Thus, the structuring approach is used for this research.

The core process of a structuring analysis is to construct a category scheme. Based on the focus, however, the process follows a different approach (Mayring, 2008):

- **_Formal structuring_ (Formale Strukturierung):** The inner structure is analyzed according to the topic of interest.

- **_Content structuring_ (Inhaltliche Strukturierung):** Information about the topic of interest is extracted and summarized.

- **_Typecasting structuring_ (Typisierende Strukturierung):** Distinctive aspects are searched for and described on a typecasting dimension.

- **_Scaling structuring_ (Skalierende Strukturierung):** The material is assessed based on dimensions in form of scale points.

The goal of this research is to be able to answer the previously defined research questions. Therefore information about shared context and shared identity has to be extracted from the text. In order to be able to interpret the material in a meaningful way it will have to be summarized as well.

According to Mayring (2008), this is exactly what the content structuring analysis aims for, which has thus been chosen for this research project.

The four forms of the structuring analysis actually only differ in step 2, *Establishing the structural dimensions*, and step 8, *Result processing*. Steps 3 to 7, the *Compilation of the category system* and the *Phrasing of definitions, anchor examples and coding rules, labeling and processing of references*, remain the same and are therefore the most important part of the structuring analysis (Mayring, 2008).

Step 1
Bestimmung der Analyseeinheiten
Determination of the analysis units

Step 2
Theoriegeleitete Festlegung der inhaltlichen Hauptkategorien
Theory based definition of the main categories

Step 3
Bestimmung der Ausprägungen (theoriegeleitet) und Zusammenstellung des Kategoriensystems
Theory based composition of the category scheme

Step 7	Step 4
Überarbeitung, gegebenenfalls Revision von Kategoriensystem und Kategoriendefinition	Formulierung von Definitionen, Ankerbeispielen und Kodierregeln zu den einzelnen Kategorien
If necessary, revision of the category system and category definitions	Phrasing definitions, anchor examples and coding rules

Step 5
Materialdurchlauf: Fundstellenbezeichnung
Material processing: Reference labeling

Step 6
Materialdurchlauf: Bearbeitung und Extraktion der Fundstellen
Material processing: Processing and extraction of references

Step 8
Paraphrasierung des extrahierten Materials
Paraphrasing of the extracted material

Step 9
Bestimmung des angestrebten Abstraktionsniveaus und Generalisierung der Paraphrasen unter diesem Abstraktionsniveau
Definition of the abstraction level and generalization of the paraphrases

Step 10
1. Reduktion durch Selektion, Streichen bedeutungsgleicher Paraphrasen
1st Reduction by selection, rejection of redundant paraphrases

Step 11
2. Reduktion durch Bündelung, Konstruktion, Integration von Paraphrasen auf dem angestrebten Abstraktionsniveau
2nd Reduction by grouping, integrating of paraphrases of the same abstraction level

Figure 6: Combined process model (adapted from Mayring, 2008, and translated by the author)

A closer look at the process models of the summary, explication, and structuring approach also shows that they are not so different either, and that the content structuring is a combination of

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the structuring and the summary approach. A process model has thus been created combining the content structuring and the summary analysis. Again Mayring's original wording was kept and extended with an English translation. The resulting model is shown in Figure 6 and used as the process model for this research.

IR1	Determination of the analysis units
IR1.1	Define the coding unit, evaluation unit and context unit!
IR2	Theory based definition of the main categories
IR2.1	Deduct the substantive main categories from the research questions!
IR2.2	Define the main categories as variables, which can have different characteristic values!
IR2.3	Reason that the text can provide material!
IR3	Theory based composition of the category scheme
IR3.1	Determine the characteristics for the individual variables!
IR3.2	Chose a complexity degree appropriate for the research question and the material!
IR3.3	Mind the definition of rest categories (half/half, partly/partly, ambivalent, unclear, …)!
IR4	Phrasing definitions, anchor examples and coding rules
IR4.1	Define the characteristics in detail!
IR4.2	Phrase anchor examples for the characteristics! They serve as typical example for the respective characteristic.
IR4.3	Define rules for how to code between the characteristics in borderline cases!
IR4.4	Compose them into coding guidelines!
IR5	Material processing: Reference labeling
IR5.1	Label all text paraphrases that contain relevant information!
IR5.2	Note hereby what was defined as analysis unit!
IR6	Material processing: Processing and extraction of references
IR6.1	Estimate the analysis unit based on the reference and according to the coding guidelines!
IR6.2	If the coding is conclusive and definite, add references as anchor example to the coding guidelines!
IR6.3	If the coding is inconclusive make a decision and define a new coding rule for similar cases! Add this coding rule to the coding guidelines!
IR7	If necessary, revision of the category system and category definitions
IR7.1	If there are indications for a wrong choice or definition of characteristics revise them!
IR7.2	In this case perform step 3 to 6 again!
IR8	Paraphrasing of the extracted material
IR8.1	Delete all text passages without content, e.g. decorating, repeating, elucidating words!
IR8.2	Translate the text passages with important content onto a uniform language level!
IR8.3	Transform them into a grammatical short version!
IR9	Definition of the abstraction level and generalization of the paraphrases
IR9.1	Define a level of abstraction!
IR9.2	Translate the German passages into English!
IR9.3	Generalize the topics of the paraphrases onto the defined abstraction level, so that the old topics are implicit in the new phrased ones!
IR9.4	Generalize the predicates in the same way!
IR9.5	Leave the paraphrases that are above the defined abstraction level!
IR9.6	In case of uncertainty use theoretical presupposition!
IR10	First reduction by selection, rejection of redundant paraphrases
IR10.1	Strike out redundant paraphrases within one analysis unit!
IR10.2	Strike out paraphrases that do not contain essential content on the new abstraction level!
IR10.3	Accept the paraphrases, which still contain essential content (selection)!
IR10.4	In case of uncertainty use theoretical presupposition!
IR11	Second reduction by grouping, integration of paraphrases
IR11.1	Sum up paraphrases with the same (similar) topic and similar statements to one paraphrase (grouping)!
IR11.2	Sum up paraphrases with multiple statements regarding one topic (construction / integration)!
IR11.3	Sum up paraphrases with the same (similar) topic and different statements to one paraphrase (construction / integration)!
IR11.4	In case of uncertainty use theoretical presupposition!

Table 3: Interpretation rules (Mayring 2008)

Based on the process model Mayring (2008) formulates *interpretation rules* (Interpretationsregeln) for each step. The interpretation rules of Table 3 belong to the process model

introduced in Figure 6. In the following sub-chapters these interpretation rules will be discussed and applied to the material.

3.2.6.1.   Determination of the analysis units

As the first step of the process model the analysis units have to be defined to insure the precision of the content analysis. The *coding unit* (Kodiereinheit) is the smallest part of the text that can be assigned to a category (Mayring, 2008). A single word can already contain information concerning the research questions and will therefore be defined as coding unit for this research.

The *evaluation unit* (Auswertungseinheit) describes which parts of the text will be analyzed consecutively. Consequently it defines when and how often certain information will be extracted from the text and then used in the analysis. If the interview is chosen as an evaluation unit then only one assessment is made for the whole transcript of this interview (Mayring, 2008), which would not be very useful in the case of this research. The evaluation unit will therefore be defined as a text passage about the relevant topics.

The *context unit* (Kontexteinheit) describes the largest part of the text that can be assigned to a category at once (Mayring, 2008) and will be defined as a, for the research topic relevant, paragraph.

3.2.6.2.   Theory based definition of the main categories

The main topics of both research questions are the development of shared context and shared identity. Consequently the two main categories are called *Building shared context* and *Building shared identity*. It has to be pointed out that the categories not only include information about building, but also about maintaining shared context, or shared identity respectively. To simplify matters, however, only the word "building" is used in the category name. This is legitimate because, as explained before, both shared context and shared identity are dynamic concepts that are constantly changing. Thus a team will never be able to complete the task of building them.

During the analysis all paragraphs describing the physical context and the local surroundings (Hinds & Bailey, 2003) as well as the mental context, the available information and tools, and the work process (Hinds & Mortensen, 2005) will be assigned to the first category, *Building shared context (C1)*. All paragraphs concerning the *we-ness* of a group, the feelings towards the colleagues and what enables the group to work together well (Cerulo, 1997; Hardy et al., 2005) will be assigned to the second category, *Building shared identity (C2)*.

The interview questions were designed to gather material answering the two research questions and the interviews were conducted in IT teams of two international organizations. Since the categories are derived from the research questions, as well as based on findings of previous studies, it is expected that the information from the interviews will contain plenty of material for both categories.

3.2.6.3. Theory based composition of the category scheme

According to Mayring (2008), each main category is to be split up into subcategories, which he calls *characteristics*. The characteristics are derived from literature, as well as from the empirically collected data, and it has to be ensured that there is enough material for each characteristic to be meaningful. Rest subcategories like *neutral* or *undefined* have to be taken into account as well, to cover the whole category. In addition, a category called *Idiosyncratic* was introduced for references that were interesting, but did not fit into any of the other categories. Mayring (2008) recommends the use of an ordinal scale for the subcategories. For answering the research questions of this thesis, however, nominal scales with characteristics closely related to the main categories were chosen, as those are more meaningful and expressive.

As already mentioned, the first main category is called *Building shared context (C1)*. It is illustrated, together with all its characteristics, in Figure 7. The development of shared context heavily depends on information exchange (Brézillon, 1999; Te'eni, 2001; Brézillon & Pomerol, 1999). Exchanging information can be seen as the precondition and framework for building a shared context. The first characteristic is therefore called *Information exchange (C1.1)*. It is intended to identify the different strategies for knowledge sharing in teams. As explained before, the conscious and active exchange of information is especially important for building a shared context. Thus only paraphrases regarding such an information exchange will be assigned to this characteristic. A simple conversation would not be enough to fit into this category. The information exchange has to be intentional and the main goal of the conversation. Standardization is a way of explicity, thus all regular or predefined information exchanges will be assigned to this category as well. As already mentioned, shared knowledge has to be documented and organized to be not only useful for the communication partner, but also for the organization. Otherwise it will be forgotten as soon as the project is over, or someone leaves the team (Santoro & Brézillon, 2005; Araujo & Brézillon, 2004). Therefore, depending on whether the information has been shared orally or in a documented way, and if the whole team or only a part of the team has been included in the process, the paraphrases will be assigned to the corresponding subcategory. For instance, Dan, one of the interview participants, said: "Every day we have a meeting at nine o'clock, called Standup meeting. Just to touch base, what I did yesterday, what I'll be working on today, and if there are any blocking issues. We discuss that every day"

(USA, O2, 19, 00:02:22). This paraphrase concerns the information exchange at a daily meeting and has thus been added to the subcategory *Meeting (C1.1.1)*.

Figure 7: Main category *Building shared context* and its characteristics
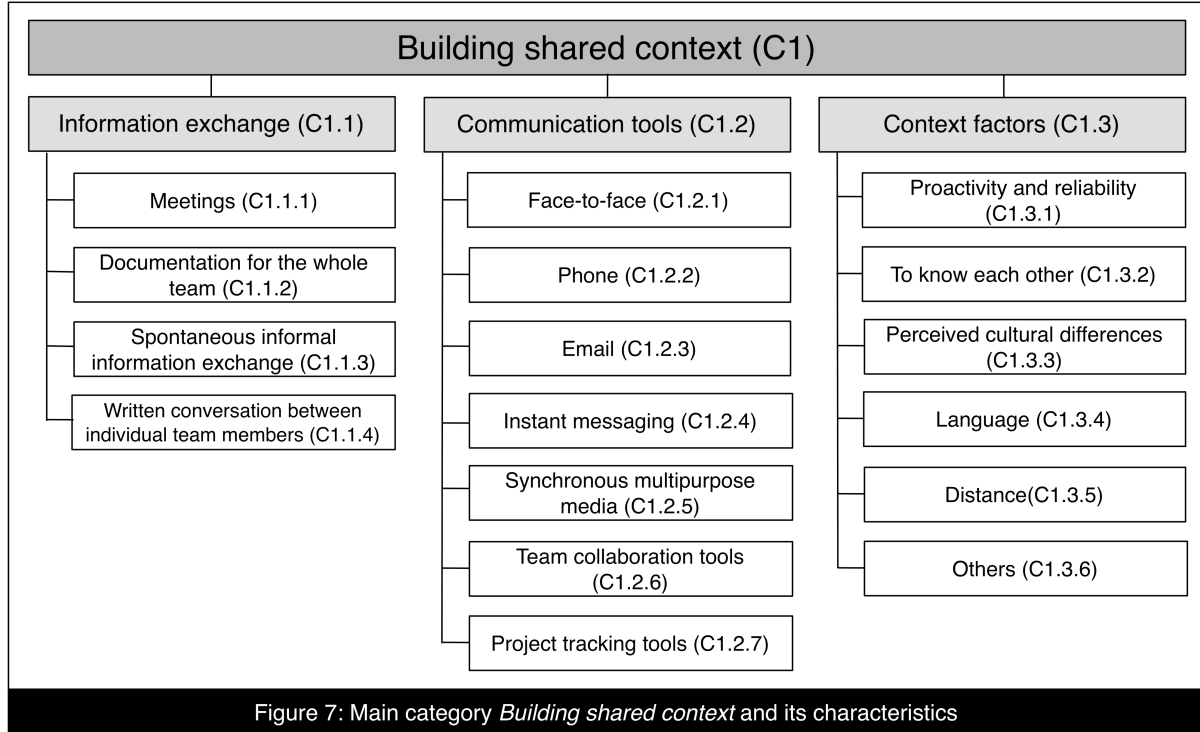
To sum up, this first subcategory, *Information exchange*, describes the basic prerequisites that are necessary for the development of a shared context. Information exchange is closely connected to the communication media that provide the necessary platform and channel for developing shared context. In line with these arguments Hinds and Mortensen (2015) suggest that the compatibility between the individual team members' tools and work processes is an indicator for their shared context. Therefore a second characteristic, called *Communication tools (C1.2)* has been introduced and will be used to analyze which communication media foster the creation of shared context and, if the tools of the individual team members are compatible. Every time the use of a medium (or face-to-face communication) is mentioned in connection with shared context building a paraphrase will be assigned to the respective subcategory. The statement can contain information as to whether the medium is helpful or not, but can also just mention it. The classification of media was derived from Dennis et al., (2008) and transferred into subcategories that fit the data material. Consequently statements like: "Naja wir verwenden als Plattform SharePoint wo wir unsere Dokumente austauschen" (AT, O1, 5, 00:02:46), are categorized as *Team collaboration tools (C.1.2.5)*.

The first subcategory, *Information exchange*, describes the general framework for building shared context, while the second subcategory, *Communication tools*, describes the channels used to develop it. The interviews revealed, however, that building a shared context depends on more than just the basic requirement of information exchange and the support of communication tools. Multiple soft factors can influence the development of shared context in both, positive and negative ways (Hinds & Mortensen, 2005; Santro & Brézillon, 2005). Therefore a characteristic *Context factors (C1.3)* will be used here as well. Five such influences have been identified from the dataset and all paraphrases that either directly state, or indirectly imply that a certain communication tool, a situation, some circumstances, etc. helped to build a shared context will be assigned to the corresponding subcategory. If such a classification is not possible the respective paragraph will be assigned to the category *Others (C1.3.6)*. The subcategories can contain positive and negative statements and are also illustrated in Figure 7. C1.3.2, for example is called *To know each othe*r and therefore contains all interview answers, which indicate that it is beneficial for the development of a shared context if the team members already know each other. It contains statements like

> The developers and QA here are all people I have worked with for a long time – for ten, or more years. And so I know them well and I feel like I can pretty easily just go up to them and say: Hey Geoffrey how does this work, or whatever. And I'll get an answer pretty quickly on this stuff (USA, O2, 16, 00:14:40).

The second main category is called *Building shared identity (C2)*. The literature review revealed that shared context and shared identity are two very closely related concepts (Hinds & Mortensen, 2005; Swaab et al., 2008). Thus it is not surprising that their subcategories turned out to be similar as well. The general conditions differ however. As already mentioned, shared context is based on information exchange. Shared identity, in turn, can be built through social interactions (Postmes et al., 2005a) and can be formed by opportunities to communicate (Bos et al., 2010). Thus the first characteristic, *Social interactions (C2.1)*, is introduced and aims at describing the framework and general conditions in which social interactions take place in everyday corporate life. It is supposed to help identifying and analyzing the circumstances and situations, which provide the necessary preconditions and good opportunities for social interactions and therefore make the development of shared identity possible in the first place. As discussed in the theoretical part, Swaab et al. (2008) propose that social identities can either be the result of a top-down, or bottom-up process. Thus each paraphrase about social interactions, initiated either by someone in a leadership position, or a team member, will be assigned to this category. It can contain information about the location of the interaction, who organized it, who participated and which impact it had on the team feeling. Depending on the circumstances, or the setting of the interaction the paraphrase will be assigned to the corresponding subcategory. Five such circumstances have been mentioned during the

interviews. Initially an additional sixth subcategory called *Others* has been planned, but the assignment of the references showed that it would be unnecessary because all references could be classified clearly with one of the other five categories. For instance, the interview answer: "I mean we go for lunches sometimes, and other than that we don't do that much together" (USA, O1, 15, 00:21:20), has been assigned to the category *Lunch / coffee break (C2.1.2)*. The main category *Building shared identity (C2)* with all its subcategories is illustrated in Figure 8.

Figure 8: Main category *Building shared identity* and its characteristics
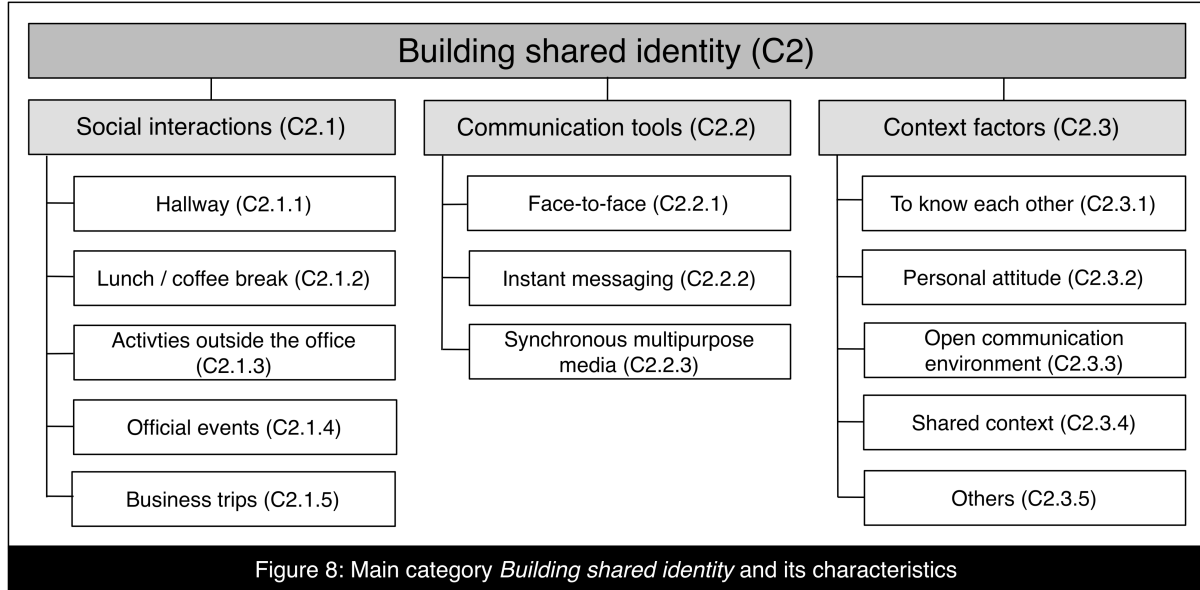
Social interactions are based on communication. According to Hinds and Mortensen (2005) communication fosters the development of shared identity. Again communication media provide the necessary platform and channel for developing shared identity. Different media, however, are associated with different advantages and disadvantages (Daft & Lengel, 1986; Te'eni, 2001). In order to be able to draw conclusions about the influence of a communication medium on the development of a shared identity a second characteristic called *Communication tools (C2.1)* is introduced. The subcategories are again based on the classification of media by Dennis et al. (2008). Dennis et al. (2008) also state that depending on how familiar co-workers are with each other and their tasks, they will have a higher, or lower need for media synchronicity. Every time the use of a medium (or face-to-face communication) is mentioned in connection with shared identity building a paraphrase will be assigned to the respective subcategory. The statement can contain information as to whether the medium is helpful or not, but can also just mention it, as it is the case with the following reference: "Ja dann kontaktieren wir uns kurzfristig: 'Was machst du zum Essen?' Meistens über dieses Chatprogramm" (AT, O2, 10, 00:06:07).

The interviews showed that building shared identity depends on soft factors as well. This is in line with the findings of Swaab et al. (2008) who showed that certain circumstances could foster the creation of shared identity, while others make it harder for a group to develop a feeling of *we-ness*. The third characteristic of the main category *Building shared identity (C2)* is thus called *Context factors (C2.3)* and contains all paraphrases, in which the respondent either directly states that something influenced her or his feeling towards the team, or where it is not directly said, but obviously implied. Statements about the *we-ness* regarding the whole team, sub-groups of the team, or individual members are also to be included. Depending on what it was that influenced the shared identity the paraphrase will be assigned to the corresponding subcategory. The subcategories can contain positive and negative statements. Four such influences have been identified inductively from the dataset. C2.3.4, for example, is called *Shared context* and contains all statements, which indicate that a shared context influences the development of a shared identity. "We all work towards a common goal. So I think that there is, and that you have, that sense of teamwork, a joined responsibility, and a joined accomplishment. And that is probably the time where you are most connected" (USA, O2, 16, 00:28:44). Again an additional subcategory *Others (C2.3.5)* has been added.

The two main categories and their characteristics sum up to 30 subcategories and will be used to classify the data collected during the interviews.

3.2.6.4.   Phrasing definitions, anchor examples and coding rules

The goal of the qualitative content analysis is to structure the material in a way that allows for an objective and reproducible interpretation. Consequently it is important that the analysis process follows rules and Mayring (2008) mentions the following three steps as especially important:

1. **Definition of the category:** Define which sections of the text belong to which category.
2. **Anchor example:** List quotes from the text that fall within one category and are good examples for this category.
3. **Coding rules:** Wherever it is hard to differentiate between two categories coding rules have to be formulated to ensure the unambiguous allocation.

Mayring (2008) recommends developing *coding guidelines* (Kodierleitfaden) with the definition, anchor example and coding rule. In a trial run the researcher moves through the text and marks the sections, which apply to one of the categories and puts them into a table for the further analysis process. Mayring (2008) also mentions that in this step most categories, definitions, and rules will be edited and reworked, which was also the case with this research project.

Table 4 shows an excerpt of the coding guidelines of category C2.1. Based on Mayring (2008) it contains the definition of the category, the respective anchor examples and the coding rules. The coding rules were developed based on the definition and discussion of the category given above. The abbreviation in the brackets after each anchor example uniquely identifies the quote. For instance, (AT, O1, 1, 00:11:49) stands for Austria, organization 1, participant 1, at 00:11:49. The complete coding guidelines can be found in the appendix.

Cat.	Definition	Anchor example	Coding rules
Hallway (C2.1.1)	Two or more team members engage in social interaction at the office in the hallway, e.g. on their way in, or to someone's desk.	"Wenn man sich am Gang trifft oder so wird natürlich auch […] kurz geplaudert" (AT, O1, 1, 00:11:49). "I might meet somebody on the, you know corridor. I might talk about a ball game, or whatever it is" (USA, O2, 19, 00:04:50).	The statement describes a face-to-face meeting at the office in the hallway or at someone's desk between two or more team members. It can be a spontaneous, or an arranged meeting. Since the meeting took place face-to-face an additional paraphrase has to be added to C2.2.1.
Lunch / coffee break (C2.1.2)	Two or more team members engage in social interaction at lunch or at a coffee break.	"Normalerweise nach dem Mittagessen gehen wir gemeinsam auf einen Kaffee. Das heißt der eine sagt: 'Coffee break'. Sozusagen. Dann gehen wir gemeinsam auf einen Kaffee. Dann stehen wir in der Küche und dann werden in der Regel – also versucht man natürlich nicht nur über die Arbeit zu reden sondern auch über andere Dinge" (AT, O1, 2, 00:05:59). "I mean we go for lunches sometimes, and other than that we don't do that much together" (USA, O1, 15, 00:21:20).	The statement describes a face-to-face meeting at lunch or for coffee between two or more team members. It can be a spontaneous, or arranged meeting. If the lunch or coffee break took place at a business trip the statement has to be categorized as C2.1.5. Since the meeting took place face-to-face an additional paraphrase has to be added to C2.2.1.
Activities outside the office (C2.1.3)	Two or more team members engage in social interaction outside of the office, e.g. getting a beer after work or doing sports together.	"Und dann natürlich vor den Weihnachtstagen hat es auch einmal gegeben, dass wir gemeinsam zum Punsch trinken gegangen sind, am Karlsplatz. Und ahh ja, wird hoffentlich in Zukunft noch häufiger vorkommen" (AT, O1, 4, 00:07:53). "Also ab und zu machen wir halt so Inoffizielles – also einfach das – das ganze Team, dass wir irgendwo essen gehen, oder auf ein Getränk am Abend, oder... Ja das kommt ein paar mal vor. Ja" (AT, O2, 6, 00:14:41).	The statement describes a meeting somewhere outside the office where two or more team members spend time together and engage in social interaction. It can be a spontaneous, or arranged meeting. If the activity took place at a business trip, the statement has to be categorized as C2.1.5. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C.2.2.2, or C2.2.3 depending on the respective medium.

Table 4: Excerpt of the coding guidelines of category *Social interaction (C2.1)*

3.2.6.5.   Material processing: Reference labeling

After the coding guidelines were completed with a trial run, the first real processing of the text begins. All sections that apply to one of the categories, the so-called references, have to be highlighted. Mayring (2008) points out that it is important to keep the evaluation unit in mind. He further recommends denoting the references on paper with a pen. This, however, can be

accomplished more efficiently with a normal text-processing program, or special content analysis programs. Commonly used programs are for example ATLAS.ti, MAXQDA and Nvivo. This research project only contains 20 interviews, therefore the usage of one of these programs would have exceeded the frame of this thesis and Microsoft Excel has been used instead.

All 20 interviews were read carefully and the relevant text sections have been copy pasted into an Excel table. To make each paragraph identifiable columns with the respective country, the organization, the team id, the participant's id, and the time stamp have been added. Examples for this code can be found in Table 4, where each anchor example is characterized that way.

3.2.6.6.   Material processing: Processing and extraction of the references

The next step according to Mayring (2008) is to valuate the references and to assign them to the appropriate category. This is achieved by means of the coding rules. For ambiguous and inconclusive references coding rules have to be added or edited. Thus the coding guidelines have to be updated continuously. Particularly clear and definite references have to be marked as anchor examples. The following statement, for instance, serves as anchor example of the subcategory *Documentation for the whole team (C1.1.2)*. "Es gibt einen gemeinsamen Space wo Dokumente abgelegt werden. Ja, das soll natürlich möglichst aktuell sein" (AT, O2, 6, 00:05:18).

The assignment of the references (coding) has also been performed in Microsoft Excel by adding columns with the categories and characteristics to the previously mentioned table.

3.2.6.7.   If necessary revision of the category system and category definitions

As already mentioned, a trial run has been performed to improve and clarify the category scheme and the coding rules. Even with a successful trial run, however, it is still possible that some of the categories have to be modified and reformulated during the first main run. In this case the interpretation rules 3 to 6 have to be performed again (Mayring, 2008), which has also been necessary for this research project. After the second main run all references were successfully and uniquely assigned to a category.

3.2.6.8.   Paraphrasing of the extracted material

In the next step all references have to be rewritten into a short paraphrase, which means that each quote is reduced to its core meaning. The paraphrases have to be on one language level, but do not have to consist of full sentences. A grammatical short version is sufficient. Only the relevant content is kept and all redundant, decorative, or meaningless parts are dropped (Mayring, 2008). For example

_____

the two statements: "Every day we have a meeting at nine o'clock, called Standup meeting. Just to touch base, what I did yesterday, what I'll be working on today, and if there are any blocking issues. We discuss that every day" (USA, O2, 19, 00:02:22) and "So we kind of have a touch base meeting every day. So I would say, every day, nine am" (USA, O2, 19, 00:16:34) were both paraphrased into: "Knows from daily Standups what colleagues are working on".

Table 5 shows a more detailed example. A new column with an id for each paraphrase has been added to the table in Excel to be able to identify it. The references in this excerpt of the original table belong to the category C1 (*Building shared context*), but to different subcategories. The first four columns indicated the organization, the country, the respondent ID and the paraphrase ID of the respective reference.

Some references in the data set are rather long, because they could not be separated without losing their meaning. To ensure a smooth and clear analysis, multiple paraphrases have been formulated for these references, namely one for each core meaning. Table 5 also shows an example for one of these cases.

Or	Ctry	ID	PID	Reference	Paraphrase
1	AT	3	74	"So we have daily Standup. Everybody speaks for two three minutes about what have I done yesterday, what I plan to do today and ahm other than that most of the communication is spontaneous. And on demand if I need something, if I don't know something I just ask immediately" (00:03:41).	Knows from daily Standups what colleagues are working on.
1	AT	3	76		If he needs something right away he just asks his colleagues.
1	AT	5	139	"Naja wir verwenden als Plattform SharePoint wo wir unsere Dokumente austauschen" (00:02:46).	Dokumente und Protokolle werden auf SharePoint ausgetauscht.
1	AT	5	148	"Ja prinzipiell hat natürlich jeder Zugriff zum SharePoint wo unsere offiziellen Dokumente liegen" (00:05:32).	Alle haben Zugriff auf die Dokumente am SharePoint.
2	AT	8	246	"Ja natürlich gibt es Missverständnisse. Sei es zum einen, dass man ahh einige dabei haben, die halt nicht Muttersprache Deutsch haben. Da kann es halt einfach sein, dass manche Sachen einfach falsch ankommen" (00:08:31).	Es gibt manchmal Missver- ständnisse weil nicht alle im Team Deutsch als Mutter- sprache haben.
1	USA	14	430	"When we first started out with the project we tried some elaborate mechanisms, like spread sheets and things like that, but nobody bothered to maintain them so we kind of just went back to this ongoing peace of paper" (00:11:44).	A more fluid flow of information is necessary with more flexible tools that support multiple ways of information sharing.
2	USA	19	591	"Every day we have a meeting at 9 o'clock, called a Standup meeting. Just to touch base, what I did yesterday. What I'll be working on today and if there are any blocking issues, you know stuff like that. We discuss that every day" (00:02:22).	Knows from daily Standups what colleagues are working on.
2	USA	19	628	"So we kind of have, you know a touch base meeting every day. So I would say, every day, 9 am" (00:16:34).	Knows from daily Standups what colleagues are working on.
				Table 5: Examples of references and their paraphrases in the category C2	

3.2.6.9. Definition of the abstraction level and generalization of the paraphrases

Mayring (2008) calls this interpretation rule the *macro operator generalization* (Makrooperator Generalisierung). Generalization thereby means to summarize very specific content to achieve a more general statement. The topics of the paraphrases, as well as the predicates have to be generalized. To accomplish this, a level of abstraction has to be defined first. All paraphrases that are currently under the abstraction level have to be generalized onto it, so that the original topics are implicit in the new paraphrases. This means that paraphrases that belong together, or have similar content are summarized into one new statement. Paraphrases that are above the generalization level are left there for now. In case of uncertainty theoretical presuppositions should be used.

As already mentioned, the interviews were conducted in German and English. Since the language used for this thesis is English all German paraphrases had to be translated into English to allow a uniform analysis.

The abstraction level is defined as general statements about the main topics of the developed categories: *Information exchange*, *Social interactions*, *Context factors* for shared context and shared identity, and *Communication tools*. The application of the generalization with this level of abstraction will result in short, clear and usable paraphrases, of which some will have the same content. These identical paraphrases can now be deleted in the course of the first reduction. Examples of the applied generalization can be found in Table 6, which also already illustrates the results of the first reduction.

3.2.6.10. First reduction by selection, rejection of redundant paraphrases

The generalization brought the paraphrases onto the same level and therefore redundancies became more obvious. Now the interpretation rules IR10.1-IR10.4. are applied and the first reduction is being performed. Mayring (2008) points out that it is important to mind the scope. Consequently paraphrases that are identical within the references of one respondent, within one subcategory, will be discarded, as well as unimportant paraphrases. For example some interview participants mentioned multiple times that they exchange information every morning at their Standup meeting, or that they like to chat with their colleagues during their coffee break. However this information would be redundant and therefore only one generalization per participant is kept.

Paraphrases that still contain important content are accepted as they are. Again theoretical presuppositions are used in case of uncertainty (Mayring, 2008). Table 6 continues the previously

used example and shows an excerpt of the table resulting after the generalization and the first reduction.

Or	Ctry	RID	PID	Paraphrase	Generalization
1	AT	3	74	Knows from daily Standups what colleagues are working on.	Knows from Standups what colleagues are working on
1	AT	3	76	If he needs something right away he just asks his colleagues.	If he needs something he just asks his co-located colleagues
1	AT	5	139	Dokumente und Protokolle werden auf SharePoint ausgetauscht.	~~SharePoint is used for document sharing~~
1	AT	5	148	Alle haben Zugriff auf die Dokumente am SharePoint.	SharePoint is used for document sharing, everybody has access
2	AT	8	246	Es gibt manchmal Missverständnisse weil nicht alle im Team Deutsch als Muttersprache haben.	Communicating in a language which isn't everybody's mother language bears potential for misunderstandings
1	USA	14	430	A more fluid flow of information is necessary with more flexible tools that support multiple ways of information sharing.	Using a shared space doesn't work because no one bothers to maintain it
2	USA	19	591	Knows from daily Standups what colleagues are working on.	Knows from Standups what colleagues are working on
2	USA	19	628	Knows from daily Standups what colleagues are working on.	~~Knows from Standups what colleagues are working on~~

Table 6: Example of the generalization and first reduction

3.2.6.11. Second reduction by grouping, integration of paraphrases

For the second reduction the scope has been defined as all references from one person within one subcategory. Paraphrases with the same topic, but different messages are summed up to one statement according to the interpretation rules IR11.1-IR11.4. After this phase of reduction the researcher has to make sure that the resulting new paraphrases and category scheme still represents the original material (Mayring, 2008). Thus the new and original data has been compared carefully and eventually the new data set has been accepted.

3.2.7.   Results

A total of 655 references have been assigned to the 30 subcategories of the constructed category scheme. The author assigned the references herself, but to determine intercoder reliability, a randomly chosen 10% of the references have been double coded by a colleague who assigned the references independently based on the coding guidelines. The intercoder reliability was then checked by calculating Cohen's *kappa (k)* with the following equation (Brennan & Prediger, 1981).

$$k = (\Sigma \ P_{ii} - \Sigma \ P_{i*}P_i) \ / \ (1 - \Sigma \ P_{i*}P_i)$$

$$k = (0{,}9063 - 0{,}0605) \ / \ (1 - 0{,}0605)$$

$$k = 0{,}9002$$

P$_{ii}$ ....Observed proportion of agreement (hit rate)

P$_{i*}$P$_i$ ....Chance proportion of agreement

The coding correspondence calculated in this way stands at 90%, which is a very good result given that only 64 references have been double coded and there are 30 categories.

To be able to draw conclusions about the relevance of each subcategory all the statements that were still left after the second reduction were summarized into a more general conclusions. In the following chapters the results for each subcategory will be discussed in detail.

3.2.7.1. Shared context

Information exchange (C1.1) is the first subcategory of *Building shared context (C1)* and will therefore be discussed first. Table 7 contains the summaries for each subcategory, which will be discussed below.

As Table 7 shows, 20 individuals, in ten teams, of both organizations, mentioned that they exchange information with their team members at *meetings (C1.1.1)*. That means that every team that was interviewed has regular meetings where they discuss new features and plan the next steps. Most teams have short Standup meetings every morning where everybody shares what they are currently working on. All the interview participants pointed out what a great way of exchanging information meetings are because everybody comes together and learns what the other team members are working on. Will, for example, said:

> I think that is actually really important. When we first started doing that, three or
> four years ago, there were some people that felt like: 'Oh we already have enough
> meetings. We don't need to be doing this meeting everyday.' But it is only ten
> minutes, 15 minutes long. So it is not a big thing, right. And I think that is a huge
> benefit. Because then you know exactly what everybody is doing (USA, O2, 16,
> 00:21:58).

He also pointed out that there is a big advantage of meetings over project tracking systems. "The reason Standup meetings are beneficial is because, if you are just looking at a ticket system, you tend to focus on the things assigned to you. And I don't know what Roland, Geoffrey or somebody else is doing" (USA, O2, 16, 00:23:17). In summary, the interview participants found the regular

meetings beneficial, because that they makes sure everybody is on the same page. Thus all statements concerning meetings were very positive, which is illustrated by the green background in Table 7.

Category	Summary	Ind	Team	Org
Meeting (C1.1.1)	Every team has regular meetings where they discuss new features and plan the next steps. Most teams have short Standup meetings every morning where everybody says what they are working on. The respondents appreciate this routine very much, because this way they always know what their colleagues are currently working on.	20	10	2
Spontaneous informal information exchange (C1.1.3)	Team members are benefiting substantially from exchanging work related information by casually chatting with colleagues and spontaneous discussions at the workplace. Whenever they need something they just ask their co-located colleagues.	16	9	2
Written conversation between individual team members (C1.1.4)	**Email**: Also used between co-located colleagues to be less interrupting, to send files, text, for detailed subjects and to have a track record of the communication. **Communicator**: Also used between co-located colleagues for sending code snippets. **Lync**: Used to communicate with remote colleagues.	9	6	2
Documentation for the whole team (C1.1.2)	**Helpful** - SharePoint, mailing list, Wiki, Subversion, Confluence, Git and HipChat are used for document sharing. - Git is used for code sharing. - Tickets for each task help to keep the overview and you can always look up who is working on what. **Problematic** - Shared space is not always up to date. - Inconsistency in ticket creation leads to incomplete work. - Some information cannot be shared because of security issues. - Unclear where to share what because of multiple options and unclear structure. - Hard to find things because no one documents correctly. - Not all available tools are actually used. ➔ Designated maintenance person would be helpful to keep shared space up to date.	20	10	2
Table 7: *Building shared context (C1) – Information exchange (C1.1)*				

☐ Supports the development of shared context
☐ Does not support the development of shared context

The majority of respondents mentioned that whenever they need something during the day they turn around and ask their co-located team members. "In between, if they have any questions they are usually just turning around and asking me" (USA, O1, 11, 00:06:06). This kind of *spontaneous informal information exchange (C1.1.3)* is very beneficial for the co-located members because they can easily exchange work related information by casually chatting with their colleagues and can benefit from spontaneous discussions at the workplace, as the following reference shows. "Oder auch beim Kaffee, findet das statt, dass man fragt: 'Wie geht es dir mit der Komponente gerade?' Und dann plaudert man darüber. Ist auch immer ganz interessant" (AT, O1, 5, 00:03:14). For the co-located team members this spontaneous and informal way of exchanging information is

beneficial as it is fast and easy. Therefore all the statements were positive, which is again indicated by a green background in Table 7.

Written conversation between individual team members (C1.1.4) is not as common, but some respondents said they like to write emails with their co-located team members instead of shouting over because it is less distracting for others in the same room. Email is used also because it is easy to attach files and it automatically provides a track record of the communication.

> I will email with people who have some issue, if I have some questions, and especially
> if I have to attach a file to it. I can't attach a file to it by walking over to their office.
> So I send an email (USA, O2, 17, 00:09:30).

The Communicator is also sometimes used between co-located colleagues, especially to exchange code snippets.

> Den   Chat   verwenden   wir   hauptsächlich   um   einfach   Textfragmente,   oder
> Internetadressen, oder sonstiges auszutauschen wo man halt meint: 'Ja schaue mal
> rein, das ist so und so', oder irgendwelche Links. Das geht halt schneller wenn man es
> über den Chat macht, als wenn man es demjenigen mündlich diktiert (AT, O1, 4,
> 00:04:59).

Lync is used to communicate with remote colleagues and the written conversation is also perceived very positively.

The *documentation for the team (C1.1.2)* doesn't work as well in any of the teams that participated. They use SharePoint, mailing lists, Wikis, Subversion, Confluence, Git and HipChat for document sharing and Git also for code sharing. Project tracking systems are used to keep an overview of the current tasks and are very beneficial, as long as tickets are created and maintained for every small task. Then the team members can always look up who is currently working on what. Unfortunately a lot of the time people forget to create or update tickets, which leads to inconsistencies and thus to incomplete work. Similar problems are faced when sharing documents. The shared space is not always up to date and no one documents correctly or maintains it, which makes it very hard to find desired material. Furthermore, a lot of the time it is unclear where to share material because of the multiple tools and options. Lal mentioned, however, that not all available tools are used and thus the whole available capacity is not taken advantage of.

> All communication channels we have acquire maintaining. We as engineers are guilty
> of paying the least attention. We have all the best systems, but we don't go and
> document as much. We don't can throw a file in there, but we may not label it
> properly. And nobody can find things because of that (USA, O1, 15, 00:18:39).

To make things even more complicated some information cannot be uploaded and shared because of security issues.

> There is information that we don't currently feel like putting anywhere, because we feel like that is security related. And we are still kind of working on how to handle that information. While this information might be important to a few people in the project we still don't feel comfortable putting it in any of this places (USA, O1, 11, 00:13:38).

Some of the interview participants therefore mentioned that it would be very beneficial to have a designated person who would be in charge of documenting and maintaining the shared space. One respondent mentioned that he once worked on a project where they actually had someone in charge of documentation. "I thought the communication worked exceptionally well in that situation because somebody was designated to make use that all these issues are communicated and documented properly in a structured manner" (USA, O1, 15, 00:17:48). The green and red background in Table 7 illustrates those positive and negative aspects of *documentation for the whole team (C1.1.2)*.

To sum up the results of the first category *Information exchange (C1.1)*, it has to be pointed out that tools for good information exchange seem to be available, but clear rules about how to document what and where are needed. This might be one of the reasons why meetings are the most beneficial way of exchanging information for all respondents. The amount of spontaneous informal communication is a lot higher than written conversation. This indicates that more information is exchanged with co-located than with remote team members, which can be very problematic for GDTs.

The second subcategory consists of the *communication tools (C1.2)* that were mentioned in connection with the development of a shared context. Table 8 contains the summaries of each subcategory.

As Table 8 shows, all respondents said that they use *face-to-face (C1.2.1)* communication. It is perceived as the most efficient way of communication. "Also das ist mein Ding, mit dem Team eher die face-to-face Kommunikation, weil das am – am effizientesten ist" (AT, O1, 2, 00:09:17). Face-to-face communication also improves the collaboration because people involved can point to things, use whiteboards to illustrate their thoughts, and they get the direct feedback of the communication partner, which helps them to understand their point of view. Lukas for example said:

> Das war ein typisches Beispiel wo ich mir sicher war, dass das über Mail, oder über Chat, oder über auch Telefon überhaupt nicht funktioniert hätte. Da war es wirklich notwendig, dass man zusammensteht, dass man immer sieht wenn man was

vorschlägt, wie der andere darauf reagiert, und wenn man schnell was aufzeichnet alle

sehen: 'Ja das wird dann so ausschauen' (AT, O1, 4, 00:21:28).

Many other statements are very similar, for instance: "We communicate better by drawing pictures sitting in front of a white board and being able to work through different understandings of topics, and the peoples perspectives. A picture is worth more than a 1000 words, is really appropriate" (USA, O1, 14, 00:10:00).

Category	Summary	Ind	Team	Org
Face-to-face (C1.2.1)	All respondents use face-to-face communication because it is most efficient and improves the collaboration, e.g. you can read others better and can use tools like a whiteboard to illustrate your thoughts.	20	10	2
Phone (C1.2.2)	For some respondents the phone has been replaced by synchronous multipurpose media, others still use it. The ones that do appreciate it because it is simple, does not need much bandwidth and does not distract with additional information.	14	10	2
Email (C1.2.3)	Almost all respondents use email, most of them are satisfied with it because it is easy and efficient, others point out that sometimes they do not get answers and that emails are used for collaborative work, which is not efficient.	18	10	2
Instant messaging (C1.2.4)	One Austrian respondent, but 7 US American respondents use instant messaging tools. Two respondents said they like chat because it is fast and easy, one pointed out that it is pretty much useless because it is only a duplication of what other tools can do anyway.	8	5	2
Synchronous multipurpose media (C1.2.5)	Live Meeting, Skype, Lync and Communicator are used because they can share the desktop. A few respondents appreciate video conferences because for them it can approximate face-to-face communication, but for most respondents it is only distracting and they prefer the document view. Therefore being able to share the desktop provides the greatest benefit.	18	10	2
Team collaboration tools (C1.2.6)	SharePoint, Git, FileShare, Confluence, Subversion, wikis and internal social networks are used. Multiple respondents mentioned that collaboration is not very efficient with any of these tools and that they would like to use a tool like Google Docs, but cannot because of security issues.	18	9	2
Project tracking tools (C1.2.7)	One respondent from organization 1 and six respondents from organization 2 reported that they use Jira for ticket tracking. All together they are pretty satisfied with it, but one points out that, if people do not track what they are working on the information is lost.	7	5	2

Table 8: *Building shared context (C1) – Communication tools (C1.2)*

☐ Supports the development of shared context
☐ Does not support the development of shared context

For some interview participants the *phone (C1.2.2)* has been replaced by synchronous multipurpose media, although others still use it. Those who do use it appreciate it because it is simple, doesn't need much bandwidth and does not distract with additional information. "I like telephone better, because video conference you kind of need to pay attention to the screen and the people. I prefer to just sit there" (USA, O2, 20, 00:07:13).

Almost all respondents use *email (C1.2.3)*. Most of them are satisfied with it because it is easy and efficient. As the following two references show, email is also used because the conversation

will automatically be saved. "Personally I think, that a lot of the time email is good because you have an auto trail of what happened in the past and you can go back and reference it" (USA, O2, 16, 00:03:41). "Anything that I want to clearly have a track record of" (USA, O1, 11, 00:17:07) is communicated via email.

Emails, however, seem to have some disadvantages as well. Anna mentioned that she uses email whenever she doesn't expect an answer right away. "I use email when it is a some more detailed subject, or if I don't expect someone to respond necessarily right away" (USA, O2, 18, 00:09:40). This indicates that she as well does not feel like she has to answer every email right away. Other participants, however, said that they expect their emails to be answered as soon as possible, and that they are disappointed if they do not get an answer right away. "Some people are not going to respond for days to an email. So I try to avoid that if possible. I only do email with the people I know, or who get back to me immediately" (USA, O1, 15, 00:07:03). Emails are sometimes also used for collaborative work, which is not efficient.

> You are probably familiar with Google Docs, for example. That would be much better. Then, if we were working on something together, I could literally see your cursor, as you are live editing the thing. What happens in practice is, you have an email and you attach a version, and then you email that around. And then you modify it, and then somebody has to merge it. I think that is a communication problem, because the answer to the question: 'What is the newest version?' Is: 'I don't know' (USA, O1, 12, 00:18:07).

Due to the positive and negative aspects of emails the respective row in Table 8 has been labeled with a green and red background.

Seven American respondents and only one Austrian respondent mentioned that they use *instant messaging (C1.2.4)* tools. Two of them said they like chat programs because communicating with them is fast and easy. Will, however, pointed out that having a program just for chatting is redundant. "For our team, I think, it is pretty much useless, because it is just a duplication of other places" (USA, O2, 16, 00:08:49).

Synchronous multipurpose media (C1.2.5) seem to be really beneficial when used for sharing the desktop. Live Meeting, Skype, Lync and Communicator are used mainly for this purpose and, as the following two references show, it works really well. "If I feel like some visual aids are needed, or I need to quickly show this other party what I mean. If I'm on Live Meeting I can share my screen and start drawing, or writing, or pointing to things" (USA, O1, 11, 00:15:50). "Wir haben die Möglichkeit, dass wir unseren Bildschirm sharen können. Das ist eigentlich wie wenn man

nebeneinander sitzt und man kann sich genau anschauen was die Ursache ist und was das Problem ist. Das funktioniert dann immer" (AT, O2, 9, 00:06:23).

A few respondents appreciate video conferences for multiple reasons. "Mir ist lieber wenn ich mein Gegenüber sehe, weil ich dann auch sehe wie er dreinschaut wenn ich irgendwas sage" (AT, O2, 8, 00:06:47). "I like video. I think video can kind of approximate face-to-face interactions" (USA, O1, 12, 00:23:42). However, most respondents said that video conferences are only distracting for them and that they prefer the document view. "I don't think seeing the person does any good. Sharing the screen is of more benefit" (USA, O2, 16, 00:13:26). "We get distracted by the video and most of the time you are looking at a document. You are not just talking, you are also looking at something visual, so you would rather look at what is being said" (USA, O1, 15, 00:06:32). These findings are in line with a study by Gaver, Sellen, Heat and Luff (1993) who found that a camera, which shows the objects relevant for a certain task is preferred to a face-to-face camera, which shows the actions and reactions of the other person. Video conferences also experience a lot of technical problems due to the higher need of bandwidth. Consequently it is not a very reliable tool, and the interview respondents all agree that sharing the desktop provides the greatest benefit.

SharePoint, Git, FileShare, Confluence, Subversion, wikis, and internal social networks are used as *team collaboration tools (C1.2.6)*. For the majority of the interview participants said those tools are useful, but not very efficient. They work well in a small team, but do not support simultaneous editing very well. "It is also challenging because, you know, I might be working on something – right now I'm working on a page and I'm updating stuff while somebody else is actually needing it" (USA, O2, 19, 00:08:40). For many respondents it is frustrating that good collaboration tools like Google Docs exist, but that they cannot use those because of security issues. "I wish the tools that we use in-house are more up to the standard that we have access to outside of [organization 1]. For example collaborative editing of documents in the style of Google Drive." (USA, O1, 13, 00:46:51).

One interview respondent from organization 1 and six respondents from organization 2 reported that they use the *project tracking tool (C1.2.7)* Jira to create and maintain tickets for each task.

> Wir haben jetzt seit Kürzerem ein Ticketsystem, ein System wo wir Tasks abbilden, Jira, und das funktioniert jetzt gerade ganz gut. Also wir versuchen auch fast für jede Kleinigkeit einen Task anzulegen und irgendwem zuzuweisen, zu priorisieren, und so weiter. Und dadurch haben wir jetzt eigentlich gerade einen recht guten Überblick wer was macht (AT, O2, 6, 00:13:52).

A big advantage of the tickets is that unlike the oral Standup meeting, you can always go back and look up the information you need. "Man sieht natürlich auch wer sich welchen Tasks genommen hat. Wenn man jetzt zum Beispiel nicht da war, kann man dann leicht nachschauen: 'Was ist der Status? Welche Tasks sind in Progress, welche Tasks sind erledigt?'" (AT, O2, 9, 00:07:54). On the downside, if the tickets are the only source of information the team members really depend on it and if they do not track their tasks carefully this information will be lost. "If I'm not around, I may not know. Ok. I only know what they track on the system" (USA, O1, 11, 00:23:52). Furthermore, as already mentioned, inconsistencies in the tickets can lead to incomplete work.

Country	AT					USA				
Organization	O1		O2			O1			O2	
Team	1	2	3	4	5	6	7	8	9	10
Face-to-face	x	x	x	x	x	x	x	x	x	x
Phone	x		x	x	x	x	x	x	x	x
Email	x	x	x	x	x	x	x	x	x	x
Chatter									x	
iPhone messenger						x				
AIM										x
Skype	x									x
Live Meeting	x	x				x				
Communicator		x		x		x				
Lync				x	x				x	
WebEx									x	
HipChat										x
SharePoint	x	x				x				
Git		x				x				
Confluence				x	x				x	x
Wiki					x	x				
Internal social network							x	x		
Subversion							x	x		
FileShare		x								
Jira			x	x		x			x	x
Table 9: The communication tools used in each team										

Table 9 shows the tools that are available in the different teams and organizations. Obviously many different tools are used, and even within one organization and country there are only a few consistencies. All teams use face-to-face communication and email, but beside that cooperation might be difficult because of inconsistent tools. Furthermore, most of the teams use multiple different channels and platforms to communicate and share information, which makes the communication within the team more complex.

Figure 9 shows how often which group of communication tool was mentioned in connection with building a shared context. For this illustration the data set from before the first reduction was used, because here the focus is not on which tools are used or how, but on how important the

different tools are to the participants. Therefore it does make a difference how many times a certain communication channel has been mentioned.

Figure 9: Communication tools mentioned in connection with building a shared context
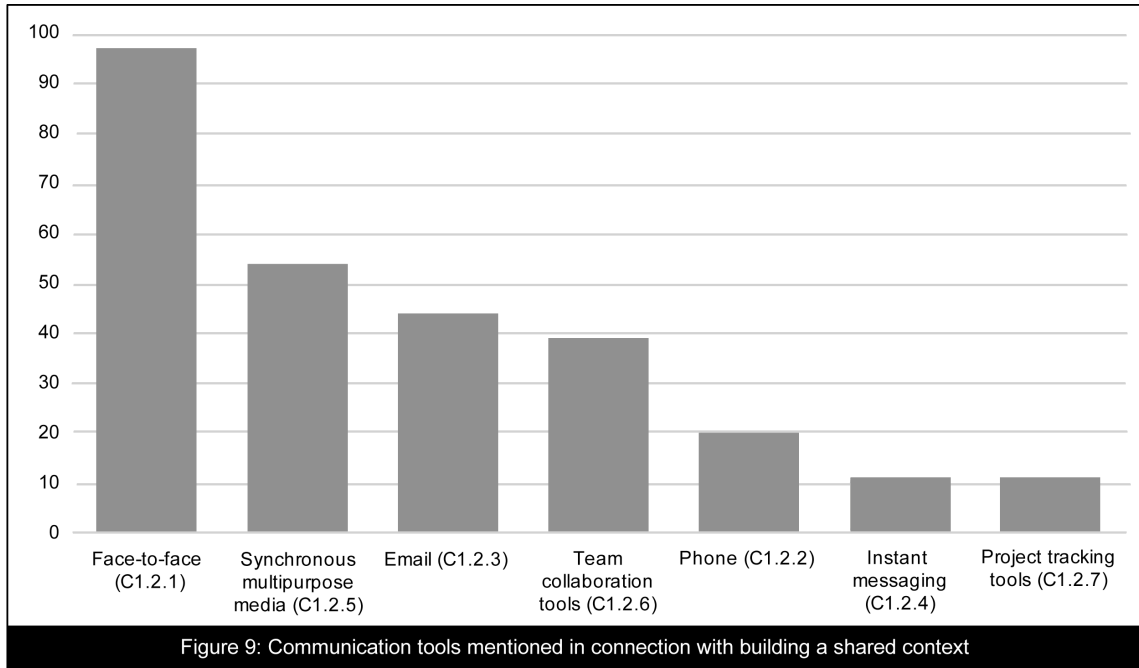
Face-to-face is obviously the most important communication channel when creating a shared context. Altogether tools supporting synchronicity (face-to-face, synchronous multipurpose tools, phone, and instant messaging) were mentioned 182 times, while tools less capable of supporting synchronicity (email, team collaboration tools, and project tracking tools) were only mentioned 94 times. They can also be helpful when building a shared context, however, tools supporting synchronicity, and especially face-to-face communication, are crucial. These results agree with the proposition of Te'eni (2001) in which he states that high channel capacity is more effective in providing context, than low channel capacity.

Table 10 contains the summaries of the third characteristic, *Context factors (C1.3)*. Again positive and negative influences are labeled with green and red backgrounds respectively. The table shows that two Austrian and six American respondents mentioned that *to know each other (C1.3.2)* makes working together a lot easier and communication more effective. As Kimball and Rheingold (2000) point out, the better we know someone, the better we can tune our words and communication style to fit the other's needs. Furthermore you will be able to understand the other better, even with less contextual cues.

We have had projects with experiences where it is really important to meet the

people. If I know the person I'm communicating with over email, where you have no

contextual cues, then you can communicate much more effectively to where there

should be fewer misunderstandings (USA, O1, 12, 00:29:25).

These observations are in line with the cognitive-affective model of Te'eni (2001) in which he describes that the receiver's reaction to a transmitted message is more uncertain, if the communicating parties do not know each other, which leads to increased dynamic complexity. He further states that lower formality is more effective for contextualization. This means that if, you know the other person you can be less formal, and you will be able to interpret the others messages better, which makes communication easier and faster. The interview participants also seem to have experienced this. "I know them well and I feel like I can pretty easily just go up to them and say: 'Hey Geoffrey how does this work?', or whatever. And I'll get an answer pretty quickly on this stuff" (USA, O2, 16, 00:14:40). In this context it is also important to note that the better the colleagues know each other, the more likely they are to share knowledge with each other (Kimball & Rheingold, 2000).

For the Austrian interview participants *proactivity and reliability (C1.3.1)* are very important to overcome unbalanced information and to prevent misunderstandings. "Es funktioniert auch gut weil diejenigen die nicht informiert waren sich halt aktiv melden und sagen: 'Ah das habe ich nicht bekommen. Kannst du mir das bitte auch weiterleiten?'" (AT, O1, 1, 00:12:24). The American colleagues, however, expect all information to be shared automatically, without having to ask for it. These different expectation and customs lead to misunderstandings and conflicts.

    I mean, they keep a lot of information almost secretive. It is very hard. You will find

    out after the fact, through somebody else, that they have a SharePoint, a repository

    for a lot of information that they generate over there. So we are supposed to be on

    the same team, but it actually feels like you have to go begging for it sometimes,

    rather than just sharing it (USA, O1, 14, 00:17:14).

Van den Hooff and De Ridder (2004) point out that knowledge sharing needs knowledge donation as much as knowledge collection and that those are both active processes in which everybody in an organization has to participate. The organization culture, however, very much influences the knowledge donation and collection, and the knowledge management in general.

Category	Summary	Ind	Team	Org
To know each other (C1.3.2)	**If you know each other** - you can interpret the others message better - working together will be easier - communication will be more effective - there will be less misunderstandings - you can be less formal Two Austrian respondents and six American respondents have mentioned this influence.	8	7	2
Proactivity and reliability (C1.3.1)	For the Austrian participants proactivity and reliability are very important to overcome unbalanced information and to prevent misunderstandings. If you did not receive certain information you just have to say so and you will get everything. American respondents, however, argue that information should automatically be shared openly without having to ask for it.	7	7	2
Language (C1.3.4)	English is defined as team language so that everybody can understand everything, but communicating in a language, which is not everybody's mother language bears potential for misunderstandings and slows down the conversation. Bad English makes it therefore hard to communicate, especially over the phone.	8	6	2
Perceived cultural differences (C1.3.3)	Organizational processes are different in different countries, thus working together is sometimes more difficult. Austrians and Germans are perceived to be very direct. Different expectations and associations make it sometimes difficult to collaborate. Americans are perceived to be more optimistic and very euphoric at the beginning, but then unreliable. Austrians are perceived to be more reserved and formal.	12	7	2
Distance (C1.3.5)	Communication with people who are not physically co-located is more difficult. When everybody is co-located they constantly hear what the others are up to, therefore there are less misunderstandings.	4	5	2
Others (C1.3.6)	Time difference makes it hard to have a conversation and to coordinate things. Security clearance can also be an issue.	1	1	1
Table 10: *Building shared context (C1) – Context factors (C1.3)*				

☐ Positive influence on the development of shared context
☐ Negative influence on the development of shared context

All the participating teams have at least one international colleague and thus English is defined as the team *language (C1.3.4)*. The whole documentation has to be in English and a fair amount of the daily oral and written communication is in English as well. "In Jira oder in Conference – überall – es wird nur Englisch verwendet. Weil auch die nicht deutschsprachigen Kollegen und Kolleginnen dann alles lesen können" (AT, O2, 7, 00:21:01).

However, communicating in a language, which is not everybody's mother language, obviously bears potential for misunderstandings.

Ja natürlich gibt es Missverständnisse. Sei es zum einen, dass wir einige dabei haben, die halt nicht Muttersprache Deutsch haben. Da kann es halt einfach sein, dass manche Sachen falsch ankommen. Darum muss man halt sehr oft nachfragen ob das

auch so ankommt, wie man das sagen will, oder ob der das auch so versteht, wie man

das auch sieht (AT, O2, 8, 00:08:31).

Bad foreign language skills obviously make it more difficult to communicate and often people happen to be rude by accident, or have troubles expressing themselves. Therefore everybody has to be patient and understanding, because if someone was rude or said something weird you have to question, if that was actually the intention, or if they just did not know better.

I would say, the major communication happens within Germany is in German, so a

lot of the emails you get have been translated, or there has been a mental translation

going on. So I tend not to interpret the way emails are written as a basis of what

somebody was thinking. You know, you kind of read it and take it for how it was

written and then kind of interpret it, based on that translation that went on, and

then get some additional clarification, and then come back and have a conversation

(USA, O1, 14, 00:17:14).

The Americans are frustrated by the insufficient language skills of their Austrian colleagues. "Another thing we are facing, especially worrying with the people in Austria, is always the language barrier. So you got to be slow with that" (USA, O2, 19, 00:14:00). Ironically, the Austrian participants, complained about their Indian and Vietnamese colleagues, because it is difficult for them to understand the different English accent. "Wir versuchen zwar alle Englisch zu reden, oder zu schreiben, aber denen ihr Englisch ist ein anderes als unseres. [laughs] Also Schrift geht noch. Mündlich wird es schwierig, dass man sie wirklich versteht. Also unsere Kollegen zumindest" (AT, O2, 6, 00:19:03).

Closely related to the language barriers are the *perceived cultural differences (C1.3.3)*. All comments on any differences were negative, or at least indicated increased difficulties when working together. One participant said there are major organizational differences, even between Austria and Germany, which makes it sometimes hard to collaborate.

"Austrians are very direct – very direct" (AT, O1, 3, 00:22:58), while Americans are perceived to use more bloomy phrases. Americans tend to talk more, and use more praise. "Zumindest bei der Kollegin ist das so – oder eher bei den meisten Amerikanern – dass sie viel mehr reden und alles mehr ausschmücken, und mehr bla bla und man muss herausfinden was derjenige eigentlich will [laughs]" (AT, O2, 6, 00:15:56). "Die Amerikaner versuchen immer mehr aufzufallen. Ja. Auch dann in der Art und Weise wie man E-Mails schreibt. Ja. Lob einfach, es wird nicht gespart beim Loben. Ja. Da hat man dann Worte wie 'great', 'huge'" (AT, O2, 7, 00:31:08). The associations with certain words are also different and can lead to misunderstandings.

Wo man dann hier von Problemen spricht, sprechen die Amerikaner über 'issues'.
Das heißt dann 'we have an issue'. Für einen Amerikanern ist ein Problem einfach
eine Katastrophe. Wenn man mit Amerikanern kommuniziert muss man das Wort
Problem meiden. Weil das ist dann für sie was anderes. Hier bei uns, im
deutschsprachigen Raum, ist es ein Problem das es zu lösen gibt (AT, O2, 7,
00:31:08).

Not only different associations, but also different expectations can make collaboration very difficult.
Some participants, for example, reported that American colleagues expect to be chatting at the
beginning of a meeting, while Europeans expect to get down to business right away. For emails it
seems to be the other way around. While Americans expect to read the most important information
at the beginning of the email, Austrians will talk about the more general things first and get to the
point later on.

Americans are perceived to be more optimistic and very euphoric at the beginning, but then
unreliable. "Die sind immer so euphorisch, auch bei den Meetings, und im Hintergrund machen sie
dann alles ganz anders. Das muss man halt mal kennenlernen. Das sind die Amerikaner. Das muss
man wissen" (AT, O2, 8, 00:12:23). Austrians, in turn, are perceived to be more reserved and formal.

I do think Austrians are a little bit more formal about the way they deal with people.
It is almost a little bit like they come from the old school when communicating. You
know, they are thinking etiquette: 'You should do this, and communicate this way.'
Where as we are a little bit more: 'We have never heard of this' (USA, O2, 18,
00:17:59).

Distance (C1.3.5) between the physical locations of the team members was also mentioned as
a negative influence on the shared context. When the team members are co-located they
automatically hear what the others are up to, so there are less misunderstandings. Furthermore,
whenever they need something they can just ask their neighbor. "I mean those of us who are here
we can talk easily, directly. I can just, you know, shout over, you know, over the desk and so on.
And we can often see each other, for example [laughs]" (USA, O1, 12, 00:06:29). Communication with
colleagues who are not co-located is more difficult and takes more effort. Especially when a lot of
things are changing quickly it becomes difficult to share every single piece of information right away.

They will be working on something and they will tell me about it – I hear
about it. And all the sudden they will have to change a bunch of stuff and they
won't have told me that they have to change it. I mean you can't be sending an
email to someone every minute to update him. But in reality sometimes work

changes so fast and if you are far away it is hard to keep people in the loop (USA, O2, 18, 00:12:22).

The subcategory *others (C1.3.6)* contains two issues that were also mentioned and influence the development of a shared context, but did not fit into any of the other categories: time difference and security issues. Time difference makes it harder to have a back-and-forth conversation and to coordinate things. "They will say: 'Ok we'll have a meeting at 10 am our time.' But that is in the middle of the night for us, so we don't get invited. So then we are not invited and they make a decision" (USA, O2, 16, 00:16:38). Security clearance sometimes makes it hard to get access, for example, to a document that is needed. As this one participant pointed out, it especially becomes a problem, if the American team members need clearance from Austrian colleagues, while it is already night in their time zone. "A big issue is when we need to be able to do something and nobody has the security clearance to do it. So it is like well, what do we do? Wake somebody up in the middle of the night?" (USA, O2, 16, 00:32:07).

3.2.7.2. Shared identity

The first subcategory of *Building shared identity (C2)* is called *Social interactions (C2.1)*. It is supposed to identify the circumstances and locations that provide opportunities for the team members to chat with each other. Table 11 shows the results for each characteristic.

Seven interview participants said that they chat with their colleagues whenever they meet in the *hallway (C2.1.1)*. "Wenn man sich am Gang trifft, oder so, wird natürlich kurz geplaudert" (AT, O1, 1, 00:11:49). A lot more interview participants mentioned that they chat with each other at their *lunch / coffee break (C2.1.2)*. Most of them meet up for lunch and coffee almost every day and they chat about private and work-related topics.

> Normalerweise nach dem Mittagessen gehen wir gemeinsam auf einen Kaffee. Das heißt der eine sagt: 'Coffee break'. Sozusagen. Dann gehen wir gemeinsam auf einen Kaffee. Dann stehen wir in der Küche und man versucht natürlich nicht nur über die Arbeit zu reden, sondern auch über andere Dinge, also mehr oder weniger Smalltalk. Beziehungsweise wenn es Dinge gibt die man für das Projekt besprechen muss, dann werden auch Projekte besprochen (AT, O1, 2, 00:05:59).

Category	Summary	Ind	Team	Org
Hallway (C2.1.1)	Colleagues chat with each other whenever they meet in the hallway.	7	5	2
Lunch / coffee break (C2.1.2)	Colleagues chat with each other at lunch or their coffee break, most of them every day. They talk about private and work related topics.	13	8	2
Activities outside the office (C2.1.3)	Colleagues sometimes spend time together outside the office. They go out for dinner or a beer and a lot of them play sports together.	13	9	2
Official events (C2.1.4)	Colleagues spend time and chat with each other at organized events. Those are mostly evening activities, like going out for dinner or drinks, especially when international colleagues are visiting.	8	5	2
Business trip (2.1.5)	Colleagues spend time and chat with each other on business trips. For example they go out at lunch and dinner.	8	5	2
Table 11: *Building shared identity (C2) – Social interactions (C.2.1)*				

☐ Social interaction initiated by a team member (bottom-up identity building)
☐ Social interaction initiated by someone in a leadership position (top-down identity building)

From time to time some of the colleagues engage in *activities outside the office (C2.1.3)*. They go out for dinner, or grab a beer and five interview participants from three different teams mentioned that they play sports together.

> For me running is a big passion. So I like to push my friends to run as well [laughs]. The business run is not really much, so if you are really interested, the four kilometers you can do any time. So I organize this with two other colleagues and we did it together and had a beer (AT, O1, 3, 00:18:36).

"Ja also zum Beispiel gehen wir jede Woche Fußball spielen. So ab und zu Super Bowl schauen. Solche Sachen" (AT, O2, 8, 00:10:18).

At *official events (C2.1.4)* team members also have opportunities to spend time together and chat with each other. Those are mostly evening activities, such as going out for dinner, or drinks, especially when international colleagues are visiting. "So it varies, and a lot of it is when we have people from out of town coming. So if we have the VP, or manager coming, you know, we will go out, and stuff like that" (USA, O2, 19, 00:15:48). Some of the teams go bowling and one participant shared that his boss sometimes organizes a laser tag tournament. "We did laser tag a couple of times, as a team. And our boss made it even more fun by challenging a different team. That was really nice" (USA, O1, 12, 00:40:27).

The occasions where team members spend the longest period of time together and get to know each other really well are *business trips (C2.1.5)*.

> We all have travelled for work together. Gone to Vienna, been there for a week or two, gone to user conferences. So that is a time where there is a lot of social interaction. Because you are in another country and you are with your coworkers. You are going out for dinner and that kind of stuff (USA, O2, 16, 00:24:03).

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For some of the participants this is actually the only time they socially interact with their team members except for work.

> The only time we have spend time outside of here is probably if I'm going to Germany with one other colleague in the team. Right. So we tend to spend a whole week going to dinners, bars, whatever. So we get to know each other much better – otherwise we go back to the families (USA, O1, 15, 00:21:20).

The interview answers showed that chatting in the hallway, at lunch or a coffee break, and activities outside the office are initiated by team members, which is indicated in Table 11 by the blue background. Official events and business trips are naturally organized by the management and are thus highlighted with yellow in Table 11. These findings are in line with the theory of Postmes et al. (2005a), according to which shared identity can be the result of a bottom-up process where it is developed from within the team, or as a top-down process where it is deducted from a supra individual level. In the case of organizational teams, the organization itself serves as the supra individual level. Social interactions initiated by the management are thus considered top-down occasions, since the resulting shared identity will be inferred from the organization. Social interactions initiated by team members are considered bottom-up occasions, because the resulting shared identity will be constructed by the individual team members.

Looking at Table 11 the five circumstances for social interactions seem to be almost balanced, but interestingly there is a major difference between the Austrian and the American teams. Figure 10 illustrates, that the Austrian interview participants mentioned a lot more bottom-up and a lot less top-down occasions, than the American participants. In the USA the two paths for building shared identity are almost balanced and seem to be equally important, while in Austria the bottom-up interactions play a much bigger role.

Figure 10: Two paths of identity building in Austria and the USA
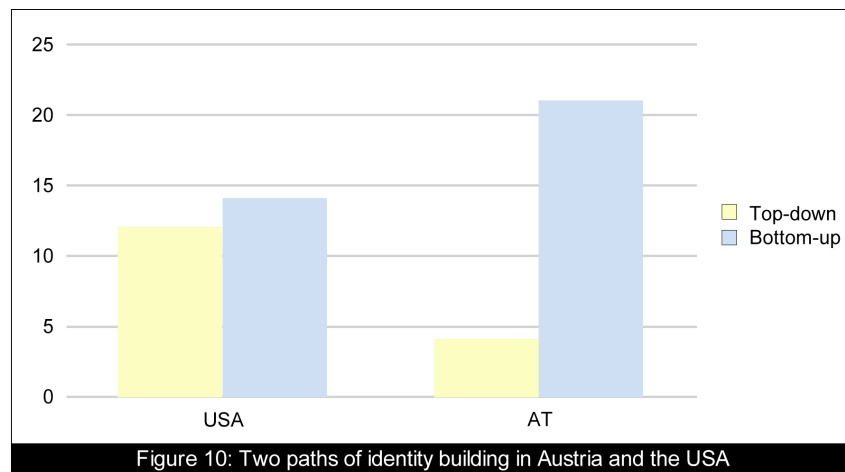
The second subcategory consists of the *communication tools (C2.2)* that were mentioned in connection with the development of a shared identity. Table 12 contains the summaries of each subcategory. Looking at this table it becomes obvious how important *face-to-face (C2.2.1)* communication for shared identity is. The interview participants stated that they prefer face-to-face communication because they feel it is more personal and gives a community feeling.

> Über Telefon wäre dann eben dieses gemeinschaftliche, und das visuelle nicht so da gewesen, dass man eben immer wieder die Vorschläge vor sich gesehen hätte. Also das hätte dann eben irgendwie über einen shared Desktop funktionieren müssen, wo dann jeder irgendwelche Grafiken aufmalt, aber das hätte auch viel länger gedauert als wie wenn man es einfach auf die Tafel malt. Ja natürlich wäre es dann möglich über Webcams, oder so, irgendwie eine Videokommunikation zu machen, aber da hätte dann wirklich das gemeinschaftliche Erlebnis gefehlt (AT, O1, 4, 00:21:28).

Face-to-face communication makes it easier to understand the feelings and thoughts of the communication partner and you can talk more freely. "I try to insist that we meet in person, so that we can talk more freely and there is more human contact and a more personal aspect of things" (USA, O1, 15, 00:02:53).

Category	Summary	Ind	Team	Org
Face-to-face (C2.2.1)	They use face-to-face communication because it is more personal and gives a community feeling. It also makes it easier to understand the feelings and thoughts of the communication partner.	16	9	2
Instant messaging (C2.2.2)	Instant messaging is also used for private conversation, e.g. to decide what to do for lunch today.	1	1	1
Synchronous multipurpose media (2.2.3)	At the beginning of Live Meetings they chat with the international colleagues until everybody is logged in. Only then they start working.	1	1	1
Table 12: *Building shared identity (C2) – Communication tools (C.2.2)*				

☐ Supports the development of shared identity

Instant messaging (C2.2.2) and *synchronous multipurpose media (C2.2.3)* were also mentioned in connection with the development of shared identity, however, only by one respondent each. According to these interview participants, instant messaging is used for private conversation, especially to decide what to do for lunch. At the beginning of Live Meetings the team members chat and catch up with the international colleagues until everybody is logged in. Only then they start working. "Bei diesen Live Meetings ist es so, dass man meistens, bis sich alle eingewählt haben kurz plaudert: 'Wie gehts?' Manche sind in München, die meisten sitzen ja irgendwo anders. Da wird ein bisschen geplaudert, aber dann eigentlich schon fokussiert gearbeitet" (AT, O1, 1, 00:11:49).

As Figure 11 shows, face-to-face communication is by far the most important channel for developing a shared identity.

Figure 11: Communication tools mentioned in connection with building shared identity
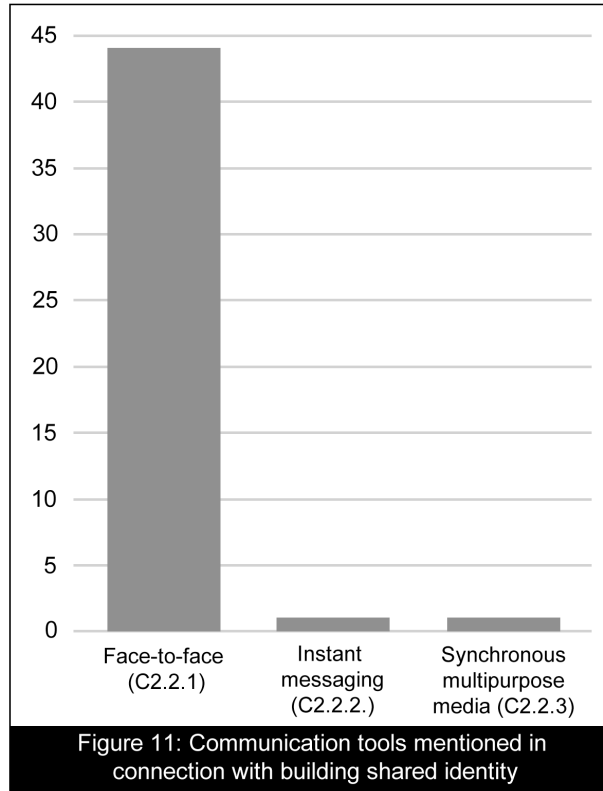
Last but not least the *context factors (C2.3)* of building shared identity will be discussed. Table 13 contains the summaries for each characteristic. The interview answers showed that a *shared context (C2.3.4)* has a very positive influence on the shared identity. Ten out of 20 participants reported that working together, receiving positive feedback and having responsibility and ownership strengthens the team feeling and group cohesion. "Wenn man Aufgabenstellungen bewältigt und dann positives Feedback hat, das fördert das Teamgefüge" (AT, O1, 2, 00:16:38). "Das Projekt ist sozusagen die Klammer für das Team" (AT, O2, 2, 00:16:38).

A common goal for all team members seems to be very important, because it creates a shared experience and team spirit. "We all work towards a common goal. So I think that there you have that sense of teamwork and a joined responsibility and a joined accomplishment. And that is probably the time where you are most connected" (USA, O2, 16, 00:28:44). A common goal strengthens the team feeling and group cohesion and according to one respondent it makes happy. "I think I was happiest when we were all working on the same thing. You know, when we were all around some greater vision, whether it is a product, or a topic" (USA, O1, 12, 00:41:27). Without a common goal it is very hard to develop a team feeling, because you have less opportunities to talk

and socially interact with each other. "Because right now we are working on totally different things, day to day, and I don't have caution or a cause really, or a business need maybe, to interrupt them. Because of course they are busy. We are all busy" (USA, O1, 12, 00:41:27).

Category	Summary	Ind	Team	Org
Shared context (C1.3.4)	Working together, receiving positive feedback and having responsibility and ownership strengthens the team feeling and group cohesion. **A common goal** - creates a shared experience and team spirit - strengthens the team feeling and group cohesion - makes happy Without a common goal there will be no team feeling.	10	7	2
Open communication environment (C1.3.3)	Meetings provide time and space for an open communication environment where supervisors as well as team members can openly speak their mind. Therefore personal misunderstandings are very rare.	8	6	2
To know each other (C1.3.1)	**When you know each other** - you feel closer to each other and start building a connection - you can better understand each other - you feel more secure with each other - it is easier to ask for help and it is more likely to get help This influence has been mentioned by one Austrian respondent and six American respondents	7	6	2
Personal attitude (C1.3.2)	**Positive influence** - The team feeling develops fast when everybody is kind and open. - Personal interest is important to understand other cultures. - Proactivity is important to become part of a team. - A good mood is important for the team spirit. **Negative influence:** Being short with others, or unfriendly because of personal distress or stress can bring down the moral of the team and is very unhelpful.	7	6	2
Others C1.3.5)	**Positive influence** - One common team language is important so that everybody can understand each other. - An open office concept provides more opportunities to chat with people. **Negative influence** - People do not loosen up as quickly when they are not talking in their mother language. - Failures as a team have a negative impact on the team feeling.	5	5	2
Table 13: *Building shared identity (C1) – Context factors (C.1.3)*				

☐ Positive influence on the development of shared identity
☐ Negative influence on the development of shared identity

As Blok, Groenesteijn, Schelvis, and Vink (2012) mentioned that in flexible work arrangements, with less presence at the office, an *open communication environment (C2.3.3)* is especially important. Meetings provide time and space for such open communication, where supervisors, as well as team members, can openly speak their mind.

Das ist auch eine von den Sachen die Scrum vorschreibt, dass alle auf der selben

Ebene sind, auch wenn der Manager dort auch sitzt, oder Teamleader – dass die

Kommunikation ganz auf der selben Ebene ist. Also das heißt ich kann sagen was mich stört, und was mich nicht stört, und was mir gefällt, und was nicht. Ich kann meine Meinung einbringen ohne Hemmung (AT, O2, 7, 00:28:47).

This open communication is very much appreciated by the interview participants, and for them it is one of the reasons why Standup meetings are so beneficial. "In a Standup meeting an issue will come up and I throw out a command like: 'Maybe we could think of doing it this way, because blablabla.' And then someone else will say: 'Well I have heard that it is not so great', or: 'I think that is a great idea.' That is spontaneous communication and that is a good reason they have Standup meetings" (USA, O2, 18, 00:06:58). Because of this friendly and open communication environment personal misunderstandings are very rare. "We all talk pretty freely to each other. So now occasionally there might be a misunderstanding, because somebody explained something, but usually just technical misunderstandings, not personal misunderstandings" (USA, O2, 17, 00:11:45).

To know each other (C2.3.1) is not only beneficial for the shared context but also for the shared identity. Team members who personally know each other feel closer and start building a connection. "Ja ich finde das extrem wichtig, dass man eben auch über private Dinge redet. Dass man sich dann wirklich als Team sieht und nicht nur als Arbeitskollegen" (AT, O1, 5, 00:13:06). The better you know someone the better you understand each other and you will feel more secure with each other.

We were all in the same place, so we were all in a small room, or in the same building at least. And then we knew each other and now, when we work apart, I can just be a little less formal about asking for something, you know, just like: 'Hey, what's up?' Or like: 'Hey how are you?' There is no hesitation, and you feel comfortable talking to them. I think that goes a long way (USA, O1, 12, 00:29:25).

Furthermore, it is easier to ask for help, and also more likely to receive help.

And I think the more you have a personal interaction with somebody, the more they need something it is not only this name that is asking for something, it is this person that I know that is asking for something. I mean as an employee I'm working. It is my job to do it either way. But still, you are a little bit more likely to go the extra mile because you know that is your friend who is asking for that. And so it creates a better work environment. It is beneficial to everybody (USA, O2, 16, 00:24:03).

Johnson et al. (2001) mention that the *personal attitude (C2.3.2)* of the team member can have positive and negative influences on the shared identity, which was confirmed by this study. When everybody is kind and open the team feeling develops fast. "Die sind so herzlich und offen, da ist es beim ersten Workshop so gewesen, dass man das Gefühl hat man ist Teil vom Team" (AT, O1,

1, 00:23:01). Personal interest is important to understand other cultures and proactivity is important to become part of a team. "Ich glaube man muss da auch ein bisschen ein persönliches Interesse zeigen um auch die Kultur zu verstehen. Also sonst kommt man nicht weiter" (AT, O1, 2, 00:19:11). A good mood has a positive influence on the team spirit. "I try to keep in mind that what one says has an impact on others. If you come in with a negative attitude it rubs of, or it may resolve in people just not wanting to be involved with you" (USA, O1, 13, 00:07:35). Being short with others, or unfriendly because of personal distress or stress, however, can bring down the moral of the entire team and is very unhelpful.

Four more influences were summed up in the subcategory *others (C2.3.5)*. One participant mentioned that their open office concept has a positive influence on the team cohesion because it provides lots of opportunities to meet and chat with colleagues. Someone else pointed out that because his team members are on a very different schedule they almost never run into each other and thus never really have opportunities for social interactions. Interestingly one respondent said that a common team language helps to understand each other, while another participant pointed out that things do not loosen up as quickly if people are not talking in their mother language and have to concentrate more on what they want to say. "Da merkt man schon mal, dass es nicht so schnell locker wird, wie wenn man von vornherein so sprechen kann wie man spricht" (AT, O1, 1, 00:23:45).

3.2.8.   Quality criteria of the content analysis

One point of discussion, regarding qualitative research, is the high amount of open assessment and interpretation. In order to provide conclusive and generally valid results, a rule based and transparent approach is needed. According to Krüger and Riemeier (2014) this is exactly what the qualitative content analysis is supposed to achieve. Mayring (2008) stresses that it is very important to follow the exact defined procedure of the content analysis and to ensure that the interpretation always respects the rules of objectivity, reliability and validity. Steinke (2000) points out that objectivity, reliability and validity are actually quality criteria for quantitative research. According to her it is possible to apply them to qualitative research, but she also notes that the opinions whether this approach is appropriate are rather controversial. She therefore introduces a list of quality criteria for qualitative research, namely intersubjective comprehensibility, indication of the research process, empirical foundation, limitation, coherence, relevance and reflected subjectivity. The following paragraphs discuss to what extend these criteria were met.

Quantitative research allows a higher level of standardization than qualitative research. It can provide intersubjective controllability, while qualitative research can only provide intersubjective

comprehensibility. Intersubjective comprehensibility can be achieved and evaluated in three different ways: documentation of the research process, interpretation in groups, codified processes (Steinke, 2000). The whole empirical research has been carried out and documented according to the rules of the qualitative content analysis of Mayring (2008). Furthermore the composition of the category scheme has been discussed in a group of three people to provide higher objectivity and the intercoder reliability stands at 90%. Consequently the intersubjective comprehensibility is assured.

By the indication of the research process Steinke (2000) refers to the evaluation of the appropriateness of the whole research process, including the qualitative approach, the choice of method, the rules of transcription, the sampling strategy, the methodological decisions and the evaluation criteria. The research questions aim at generating new hypotheses and therefore required an explorative approach. Thus semi-structured interviews with open questions were conducted. This is one of the main application areas of the content analysis, which has thus been chosen to evaluate the interviews. The qualitative approach, the choice of method and the methodological decisions are therefore justified and discussed in more detail in chapter 3.1. The rules of transcription have been introduced in chapter 3.2.3. and the sampling strategy is described in chapter 3.2.1. The evaluation criteria ask about the assessment of the whole research, which is discussed throughout this chapter.

The generation and testing of hypotheses has to follow a theory-based approach. This means that the research has to follow a codified process and has to be backed up by literature (Steinke, 2000). As already mentioned, the codified process of the qualitative content analysis has been used for this research. In addition, the hypotheses have been deducted from literature and an extensive theoretical background, presented in chapter 2., provides the frame for the research project.

The theory resulting from the empirical research has to be coherent. This means it has to be consistent and, thus, remaining questions and contradictions have to be discussed openly. Furthermore the relevance of the theory has to be reviewed (Steinke, 2000), which is discussed in chapter 4, *Discussion*. Last, but not least, the reflected subjectivity recalls that the researcher is part of the examined social world. Therefore, self-observations, personal requirements, and trust relations have to be discussed (Steinke, 2000), which is done in course of chapter 4, *Discussion*.

4.   Discussion

Shared context and shared identity are often mentioned in one breath, but as the results of the interviews show, they are influenced by different factors and describe different aspects. Shared context refers to the operational perspective and the mutual understanding, while shared identity describes the relationship aspect. Shared context and shared identity thus relate to the impacts of communication of Te'eni's (2001) cognitive-affective model. It is legitimate, and actually very important, to study both as separate and individual concepts. Nevertheless, as the results show, a shared context has a very positive influence on the shared identity. Kimball and Rheingold (2000) note that a shared physical space can generate shared identity and mention the campus or town square as examples. By definition, distributed teams will not benefit from these findings because they are not co-located. However, the interview results show that a common goal is a very important part of a shared context and actually seems to have a greater impact on the shared identity than the shared physical space. "Es ist schon so, dass man sich auf jeden Fall mehr als Team fühlt mit den Leuten mit denen man zusammenarbeitet als mit jemanden mit dem man einfach nur im Zimmer sitzt und komplett was anderes arbeitet" (AT, O1, 1, 00:22:31). In the other direction, only an indirect correlation exists. By developing a shared identity, the team members will communicate and get to know each other better, which, in turn, will have a positive impact on the shared context.

The results for the two organizations are very similar. However, the members of organization 1 reported more difficulties with documentation for the whole team, and official events seemed to be more common at organization 2. They also used slightly different tools, but except for that there were almost no differences between the results for the teams of organization 1 and organization 2. Since both organizations are technical companies and software development teams were questioned, these findings indicate that the results might be generalizable for the whole IT sector. A sample of only two different companies is not big enough, though, to draw any final conclusions.

4.1.   Summary

In the following, the results will be reviewd and each research question will be answered directly and discussed in detail.

RQ1a: Does communication facilitate the development of a shared context in teams with flexible work arrangement? If yes, how?

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Yes, communication influences the development of shared context in three ways:

1. Information exchange provides the necessary platform for building shared context.

2. Certain communication tools support the development of shared context.

3. To know each other fosters the development of shared context. To get to know each other you have to communicate.

Meetings are the most important and most effective way of information exchange. The team members benefit from the face-to-face communication and appreciate the daily Standups, where every team member says what they are currently working on in just a few sentences. That way the team members are always up to date and misunderstandings are very rare. The amount of spontaneous informal communication is a lot higher than written conversations between team members. This indicates that more information is exchanged between co-located than between distributed team members, which can lead to unbalanced information between those two groups. Whittaker (1995) as well as Bos et al. (2010) reported in their studies that people who are co-located communicate on a more regular basis. It seems like the ICT technology has not been able to change much in terms of integrating remote team members. The documentation for the whole team is challenging. The tools for good and consistent documentation are available, but the team members do not take the time to document, to organize, and to maintain the shared space. Some participants reported that there are too many different options and tools for sharing documents, which leads to general confusion. Therefore they wish for a person who would only be in charge of the documentation and for maintaining the shared space. This would probably not be a feasible solution for many organizations. Thus, the teams should consider formulating clear rules about how to document what, where to document it, and actually comply with those rules.

Face-to-face communication is by far the most important channel for developing shared context. However, communication tools supporting synchronicity are useful as well. Being able to share the desktop seems to help a lot, as most respondents prefer the document view to the facial view. The synchronous multipurpose tools are therefore very beneficial for building shared context between distributed team members and are able to support high availability. These findings fit the theory of media synchronicity in which Dennis et al. (2008) state that communication media which supports high synchronicity is especially relevant for convergence processes. However, most tasks need conveyance and convergence processes and thus the communicators profit from a variety of communication channels, as provided by synchronous multipurpose media. Each team is using at least one collaboration tool, but they are all rather frustrated by them because simultaneous work and versioning does not work very well. Multiple interview respondents said they wish they were allowed to use Google Docs because it is superior and offers great usability. Already in 1963, Luff,

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Heath, and Greatbatch reported that computers are a great help when working collaboratively on a single document, but that synchronous collaboration is very insufficient. It is hard to believe that this issue still remains unresolved.

Certainly the communication between people who know each other is more efficient. They are better able to cooperate and can better work together. And as one participant put it, the mutual understanding between two people not only depends on the communication in that particular situation, it is based on all the communication that has taken place between those two up to this point. "I hesitate to say that it has so much to do with communication in that moment as it has to do with what is learned from all the communication between those two people and their shared experience" (USA, O1, 13, 00:32:05). Since knowing each other has a positive impact on the development of a shared context distributed teams should consider organizing a face-to-face kickoff when they first start working together. Haywood (2000) has also suggested this. If such a kickoff is not possible the team members will have to meet each other electronically. However, they should still take the time to exchange some personal background before they start working. It is important to keep in mind how much first impressions matter when we meet someone new and that with computer-mediated communication, it is harder to develop trust and more difficult to correct a bad first impression (Bos, et al. 2010).

RQ1b: Does communication facilitate the development of shared identity in teams with flexible work arrangement? If yes, how?

Yes, communication influences the development of shared identity in three ways:
1. Social interactions provide the necessary platform for building shared identity.
2. Certain communication tools support the development of shared identity.
3. An open communication environment and knowing each other fosters the development of shared identity. To get to know each other you have to communicate.

Hinds and Mortensen (2005) were right in assuming that spontaneous communication helps to develop shared context and shared identity. Running into each other in the hallways, at lunch, or at a coffee break provides the most opportunities for social interactions, which are used by most of the team members to chat and catch up with each other. Informal communication really is, as Fay (2011, p. 2014) calls it, the "social glue" of the workplace. On business trips, team members are exposed to each other for periods of time and some reported that these are the occasions where you get to know your colleagues the best. Official events, like a team dinner, bowling night, or a laser tag

tournaments are very much appreciated by all participants. Some respondents even said that those organized events are the only occasion where they ever chat and spend time with their colleagues.

Face-to-face communication is by far the most important communication channel when developing shared identity because no other medium is able to transmit personal aspects as well. However, synchronous multipurpose tools are occasionally used to chat with remote colleagues and can therefore help them build a shared identity.

An open communication environment fosters the development of shared identity because everybody can speak their minds, which helps them to find themselves and to reach mutual understanding. Knowing each other also has a positive influence on the shared identity. Because it makes you feel more secure with each other, you are better able to understand each other and more willing to help.

RQ2a: Are there differences between the Austrian and the U.S. teams when developing a shared context? If yes, which?

The Austrian and U.S. teams use very similar tools, but have slightly different expectations in doing so. For example having to ask for information that you did not receive automatically is perceived as something normal and works well in Austria. In the USA the interview participants said that they hate to have to ask for information because they feel like the others are trying to keep it secret. Thus everything should be openly shared without having to ask for it. This might be one of the reasons why Austrian participants reported that their American colleagues add people to mailing lists who do not really have anything to do with the topic. For Austrians this was distracting because they received many, for them, uninteresting emails. "Und wenn E-Mails schreibt, schreiben die Amerikaner meistens an so viele. So viele kriegen das E-Mail, auch die Leute die nicht unbedingt beteiligt sind" (AT, O2, 7, 00:31:08). Furthermore, one participant pointed out that Austrians and Americans seem to have different expectations when writing and reading emails. While Austrians start with an introduction, Americans expect to read the most important part of the message at the beginning.

> Beim E-Mail schreiben versuchen die Amerikaner die Punkte die wichtig sind vorne
> zu schreiben, und nicht so wie wir das machen. Wir fangen mit einer Einleitung oben
> an und dann sagt man was Sache ist im Laufe des Mails. Ja und sowas wie top-down.
> Die Amerikaner haben bottom up. Wenn der Amerikaner die erste Zeile liest und er
> nicht klar kommt, dann lässt er alles liegen (AT, O2, 7, 00:31:08).

RQ2b: Are there differences between the Austrian and the U.S. teams when developing shared identity? If yes, which?

In Austria, as well as in the U.S., social interactions are more often initiated by team members (bottom-up) than by people in leadership positions (top-down). In the American teams, however, the top-down occasions are almost as important as the bottom-up ones and for multiple respondents, those are actually the only times where they chat with their colleagues. One participant, for instance, said that it would be nice to do more as a team, but it is up to the manager to organize something and to pay for it. "Occasionally we have team meeting and go out for lunch or something, but is up to the manager, you know, how she wants to spend her money" (USA, O2, 20, 00:10:39). In Austria, there are also organized events, but the team members often just take the initiative and organize something themselves.

4.2.   Limitations

The research was successful in answering the research questions and it provided interesting results. Naturally, some limitations have to be mentioned. First of all, some of the US American respondents felt uncomfortable talking with an Austrian interviewer about their experiences with Austrian coworkers. Therefore, the conversation was not as open and some relevant information might not have been revealed. Future research should consider using multiple interviewers with respective cultural backgrounds. This could lead to bias due to different interview styles, but might provide more confidence for the respondents.

Due to the limited time and resources, only a sample of 20 people from two countries and two companies were interviewed. A much bigger sample would be needed to be able, however, to draw significant and general valid conclusions about the influence of the national and organizational differences on shared context and shared identity. Furthermore, only the co-located part of each team was questioned because of the financial limit and time constraint. Their answers still provided interesting insight in the everyday life of distributed teams. For future research, however, it would definitely be interesting to also interview the remote team members.

Finally, only 10% of the references have been double coded. In order to obtain more accurate about the intercoder reliability, a bigger sample would have been needed. However, it can be said with certainty that a shared context and shared identity have a positive impact on teams by helping them to overcome difficulties and to improve their collaboration. Consequently, it should be the goal

of every team to build a strong shared context and shared identity and for every supervisor to foster both.

4.3. Implications

Based on the results discussed above, the following guidelines for future GDTs were developed. They are intended to support and enable members of such teams and make developing shared context and shared identity more achievable, which will in turn improve their collaboration.

Guidelines for future geographically distributed teams:

1. **Organize a face-to-face kick off.**

   Face-to-face communication is important for building shared context and shared identity, and people who know each other are able to communicate more efficiently in order to work together in a better way. Therefore it is highly recommended to organize a face-to-face kick off when the team first starts working together. All the team members should be brought together in one location, for example a hotel. This provides opportunities for team building workshops, but also to discuss project related topics face-to-face. Furthermore, there should be enough time for the team members to get to know each other personally in a more informal setting, for example by offering sport and leisure activities, having dinner, or going out.

2. **Discuss cultural experiences and expectations openly, and define a common communication strategy.**

   The cultural and national background influences the communication style and expectations. In an international team it is thus very important to discuss previous experiences openly and friendly to be able to find common solutions and to define a common communication strategy. For example it should be defined how information will be shared, who will be included in which mailing lists, and who will have access to which artefacts and shared platforms. This discussion is best done in person at the face-to-face kick off.

3. **Chose a limited number of communication media.**

   Multiple communication media provide the same communication channels. Especially synchronous multipurpose media offer different channels, such as chatting, video conferencing, calling and sharing the desktop. It is therefore redundant to use to many different media and might lead to misunderstandings. By choosing a limited set of tools communication will become easier and clearer. The time to check for new messages will be reduced because less channels will have to be checked and if people need to go back in a conversation and look

something up they will be able to find what they were looking for quicker. It is recommended to pick one synchronous multipurpose tool, one team collaboration tool and one project tracking tool in addition to face-to-face and email communication.

4. **Define rules about what to document, where, and how.**

As previously mentioned, too many different tools can lead to confusion about what to document where and how. However, even if only one tool is used there might be multiple options for sharing information. Using the program *Confluence*, for example, one can create a blog entry, participate in discussions, create files, and much more. Thus it is important to define clear rules on how to document, where to save it, and how to label the artefacts in a meaningful way. For recurring artefacts, such as meeting protocols, it is recommended to create templates. The compliance of these standards and rules has to be ensured.

5. **Ensure an open communication environment.**

For a shared identity an open communication environment is very important. The team members have to know that they can always speak their mind and share if something is bothering them. A straightforward communication will also be beneficial for collaboration. Standup meetings provide good opportunities for open discussions, but the manager, or team leader has to ensure a flat hierarchy where everybody feels valued and is welcome to speak up. Such an open communication environment will only be possible if all team members respect and value each other.

6. **Mandatory language training.**

English is the standard language for international teams. A common language is the basic prerequisite for collaboration. Although today English is tought in school in most countries around the world, the language skills differ considerably. Voluntary language training, for all who feel they need to improve their English, is offered in many organizations, however they are not very well attended. People seem to overestimate themselves, or simply do not see how beneficial better language skills would be for them and their colleagues. Therefore mandatory language training is recommended for everybody who is not a native English speaker. In terms of team moral it would also be advisable to provide language training for the native English speakers in a second language. This could help to raise awareness on the effort and accomplishments of the non-native English-speaking colleagues and thus maybe increase patience and mutual respect.

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9. Appendix

Cat.	Definition	Anchor example	Coding rules
Category Building shared context (C1) – Information exchange (C1.1)			
Meetings (C1.1.1)	Conscious, intended and active oral information exchange at meetings. As far as possible all team members are present at meetings.	"Every day we have a meeting at 9 o'clock, called a Standup meeting. Just to touch base, what I did yesterday. What I'll be working on today and if there are any blocking issues, you know stuff like that. We discuss that every day" (USA, O2, 19, 00:02:22). "Wir haben unsere täglichen Standup Meetings immer – ungefähr um halb 10 – ahm also am Vormittag immer, wo wir halt reflektieren was hat sich am letzen Tag getan, was – wo – wo arbeiten wir gerade, was gibt es für Schwierigkeiten, was wird an – an dem Tag passieren?" (AT, O1, 4, 00:01:12)	The statement describes the conscious, intended, and active oral information exchange at team meetings. The statement can give information about standards or procedures concerning meetings and about the kind of information that is exchanged this way. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.
Documentation for the whole team (C1.1.2)	Conscious, intended and active documented exchange of information with the whole team.	"Es gibt ahh einen gemeinsamen Space wo halt Dokumente abgelegt werden. Ahh ja, das soll natürlich möglich – möglichst ahm aktuell sein. Das ist es halt nicht immer. Also wir wissen wo wir alle nachschauen können" (AT, O2, 6, 00:05:18). "All communication channels we have they acquire maintaining. We as engineers are guilty of paying the least attention. We have all the best systems, but we don't go and – and document as much. We don't care about that we can throw a file in there, but we may not label it properly. Right and there is – nobody can find things because of that" (USA, O1, 15, 00:18:39).	The act of exchanging documented information with the whole team has to be conscious, intended and active. The statement can, on the one hand, give information about standards, tools, or procedures concerning documented information exchange for the whole team. On the other hand it can also concern the kind of information that is exchanged this way. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.
Spontaneous informal information exchange (C1.1.3)	Conscious, intended and active oral exchange of information between two or more team members.	"We would walk up to each other's desk, if there is a short question and if we think we need a longer discussion then we would – we can ahh just take a ad hoc room for however time we need" (USA, O1, 13, 00:03:30). "Ja wenn irgendwelche Unklarheiten bei mir sind, wo ich mir einfach denke da frage ich lieber mal nach. Und dann auch einfach zwischendurch mal aus Interesse, frage ich mal nach ahm wie es den Kollegen gerade geht mit der – mit der Arbeit gerade. Weil, da findet man auch immer gerade irgendwelche – da kommt man auch wieder darauf dass es vielleicht Unklarheiten oder Missverständnisse gegeben hat" (AT, O1, 5, 00:03:14).	The act of exchanging oral information between two or more team members has to be conscious, intended, and active. The statement can, on the one hand, give information about standards, tools, or procedures concerning the oral information exchange between a subgroup of the team. On the other hand it can also concern the kind of information that is exchanged this way. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.

Written conversation between individual team members (1.1.4)	Conscious, intended and active written conversation between one or more team members.	"Der Microsoft Communicator. Der ist bei uns eigentlich immer offen. Und da kann man sich eben kurz irgendwas austauschen. Das ist auch selbst wenn man nebeneinander oder gegenüber sitzt ist das praktisch weil man sich dann einfach ahm Texte – einfach zuschicken kann, irgendwelche Abfragen, irgend – irgend – irgendwelche Programmcode Teile, die der andere dann direkt bei sich ausprobieren kann" (AT, O1, 4, 00:02:27). "And email is also used for more of a substantial communication where you want to go and put something on the record and it is preserved and you keep a copy of that. Things like that" (USA, O1, 15, 00:07:03).	The act of exchanging documented information with one or more team members has to be conscious, intended and active. The statement can, on the one hand, give information about standards, tools, or procedures concerning written conversations between a subgroup of the team. On the other hand it can also concern the kind of information that is exchanged this way. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.
Category Shared context (C1) – Communication tools (C1.2)			
Face-to-face (C1.2.1)	Face-to-face communication is used in a situation regarding shared context.	"Also das ist mein Ding, also mit dem Team eher die face-to-face Kommunikation, weil das am – am effizientesten ist" (AT, O1, 2, 00:09:17).	Whenever a quote is assigned to C1.1 or C1.3 a paraphrase will be added to this category, if the usage of Face-to-face communication is mentioned. Either the usage of Face-to-face communication is directly mentioned, implied, or it is explained in which situations it is used and if it is helpful or not.
Phone (C1.2.2)	A phone is used in a situation regarding the shared context.	"If somebody isn't in the office, you can use AIM, you know, call them up" (USA, O2, 19, 00:03:06).	Whenever a quote is assigned to C1.1 or C1.3 a paraphrase will be added to this category, if the usage of a phone is mentioned. Either a phone is directly mentioned, implied, or it is explained in which situations it is used and whether or not it is helpful.
Email (C1.2.3)	Email is used in a situation regarding the shared context.	"I will email with people who have some issue and I have some questions and ahh you know especially if I have to attach a file to it, I can't attach a file to it by walking over to their office, so I send an email" (USA, O2, 17, 00:09:30)	Whenever a quote is assigned to C1.1 or C1.3 a paraphrase will be added to this category, if the usage of emails is mentioned. Either usage of emails is directly mentioned, implied, or it is explained in which situations they are used and whether or not it is helpful.
Instant messaging (C1.2.4)	An instant messaging tool is used in a situation regarding the shared context.	"You know, we usually use iPhone as first way of contacting each other. He'll send a message, I'll send a message and then, you know, depending of what the problem is. A lot of times we will both go online and then we will communicate using communicator or live meeting" (USA, O1, 14, 00:04:47).	Whenever a quote is assigned to C1.1 or C1.3 a paraphrase will be added to this category, if the usage of an instant messaging tool is mentioned. Either an instant messaging tool is directly mentioned, implied, or it is explained in which situations it is used and whether or not it is helpful.

Synchronous multipurpose media (C1.2.5)	A synchronous multipurpose media tool is used in a situation regarding the shared context.	"Wir arbeiten sehr viel bei [organization 1] über Live Meeting – also wir – über, über ahm – Computer-Konferenzen sozusagen wo wir den Desktop sharen" (AT, O1, 1, 00:05:02).	Whenever a quote is assigned to C1.1 or C1.3 a paraphrase will be added to this category, if the usage of a synchronous multipurpose media tool is mentioned. Either a synchronous multipurpose media tool is directly mentioned, implied, or it is explained in which situations it is used and whether or not it is helpful.
Team collaboration tools (C1.2.6)	A team collaboration tool is used in a situation regarding the shared context.	"Naja wir verwenden als Plattform SharePoint wo wir unsere Dokumente austauschen" (AT, O1, 5, 00:02:46).	Whenever a quote is assigned to C1.1 or C1.3 a paraphrase will be added to this category, if the usage of a team collaboration tool is mentioned. Either a team collaboration tool is directly mentioned, implied, or it is explained in which situations it is used and if it is helpful or not.
Project tracking tools (C1.2.7)	A project tracking tool is used in a situation regarding the shared context.	"In unserem Ticketsystem, Jira, haben wir Tasks und man sieht dann natürlich auch wer hat sich welchen Tasks genommen. Das ist dann immer, wenn man jetzt zum Beispiel nicht da ist kann man dann – aus welchem Grund auch immer – kann man recht leicht nachschauen: was ist der Status? Welche Tasks sind in Progress, welche Tasks sind erledigt? Genau das nutzen wir auch" (AT, O2, 9, 00:07:54).	Whenever a quote is assigned to C1.1 or C1.3 a paraphrase will be added to this category, if the usage of a project tracking tool is mentioned. Either a project tracking tool is directly mentioned, implied, or it is explained in which situations it is used and whether or not it is helpful.
Category Shared context (C1) – Context factors (C1.3)			
Proactivity and reliability (C1.3.1)	Clear influence on the physical surroundings, available tools and work processes by the proactivity and reliability of individual team members.	"It is really just a question of, you know, in terms of meeting invites or particular – may have more to do with what the sender – who – who the sender thinks it is relevant to and if you happen to say: oh hey I didn't get that. Then there is really no hang about a person sending it along and sharing it" (USA, O1, 13, 00:14:23). "Es funktioniert auch gut weil diejenigen die dann nicht informiert waren melden sich halt aktive und sagen: 'Ah das habe ich nicht bekommen. Kannst du mir das bitte auch weiterleiten?'" (AT, O1, 1, 00:12:24)	The statement has to indicate an influence on the shared context by the proactivity and reliability of individual team members. The quote can either be a direct observation from the respondent where she or he explicitly says how proactivity or reliability influenced the shared context, but it may also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.
To know each other (C1.3.2)	Clear influence on the physical surroundings, available tools, and work processes because the team members know each other.	"The developers and QA here are all people I have worked with for a long time you know for ten, or more years. And so like, you know, I know them face to – I know them well and ahh I feel like I can pretty easily ahm just go up to them and say: Hey Geoffrey how does – how does this work or whatever. Ahm And I'll get an answer pretty quickly on this stuff" (USA, O2, 16, 00:14:40). "I think we all know each other well, and that – that is rare probably ahm but – but definitely helps. As far as this misunderstandings, and you know, ahm and ahh maybe it also relates to this sort of ahh – this sort of directness" (USA, O1, 12, 00:32:15).	The statement has to indicate an influence on the shared context because the team members know each other. The quote can either be a direct observation from the respondent where she or he explicitly states how prior knowledge of the team members influenced the shared context, but it may also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.

Perceived cultural differences (C1.3.3)	Clear influence on the physical surroundings, available tools and work processes by perceived cultural differences.	"Wo man dann hier auch von Problemen spricht, dann sprechen die Amerikaner über „issues". Das heißt dann „we have and issue". Das heißt dann es ist was zu bereinigen. Problem für ein Amerikanern ist einfach eine Katastrophe. Wenn man mit Amerikanern kommuniziert dann muss man das Wort Problem meiden. Weil das ist dann für sie was anderes. Weil bei uns – hier bei uns, im deutschsprachigen Raum ist es ein Problem was es zu lösen gibt" (AT, O2, 7, 00:31:08). "I do think Austrians are a little bit more formal about the way they deal with people and ahh ahh it is about what I can say. I don't – they are more likely – it is almost a little bit like they come from the old school – communicating – You know they are thinking etiquette: you should do this, and communicate this way where as we are a little bit more: we have never heard of this" (USA, O2, 18, 00:17:59).	The statement has to indicate an influence on the shared context by one or more perceived cultural differences within the team. The quote can either be a direct observation from the respondent where she or he explicitly says how the perceived cultural differences influenced the shared context, but it may also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.
Language (C1.3.4)	Clear influence on the physical surroundings, available tools and work processes by the language.	"Ja natürlich gibt es Missverständnisse. Sei es zum einen, dass man ahh einige dabei haben, die halt nicht Muttersprache Deutsch haben. Da kann es halt einfach sein, dass manche Sachen einfach falsch ankommen. Darum muss man halt sehr oft nachfragen ob das auch so ankommt, wie man das sagen will, oder ob der das auch so versteht, wie man das auch sieht" (AT, O2, 8, 00:08:31). "I would say with the, you know, another thing we are facing especially worrying with the people in Austria is always the language barrier, so you got to be slow with that" (USA, O2, 19, 00:14:00).	The statement has to indicate an influence on the shared context by the used language. The quote can either be a direct observation from the respondent where she or he explicitly says how the language influenced the shared context, but it may also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.
Distance (C1.3.5)	Clear influence on the physical surroundings, available tools and work processes by the physical distance of the team members.	"I mean those of us who are here we can talk easily, directly. I can just, you know, shout over, you know, over the desk and so on. And we can often see each other, for example" (USA, O1, 12, 00:06:29). "And they will be working on something and I hear something about it – they will tell me about it – I hear about it. And ahm all the sudden they will have to change a bunch of stuff and I – they won't have told me that they have to change – I mean you can't be sending an email to someone every minute to update him. But in reality, sometimes work changes so fast, and if you are far away it is hard to keep people in the loop" (USA, O2, 18, 00:12:22).	The statement has to indicate an influence on the shared context by the physical distance of the team members. The quote can either be a direct observation from the respondent where she or he explicitly states how the physical location of team members influenced the shared context, however it can also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.

Others (C1.3.6)	Clear influence on the physical surroundings, available tools and work processes by a factor or circumstance not fitting into C2.3.1 – C2.3.5.	"And also there are information that currently we don't feel like putting anywhere. Because we feel like that is security related. And we are still kind of working on how to handle that information. While this information might need to be – important to a few people in the project. We still don't feel comfortable putting it in any of these places" (USA, O1, 11, 00:13:38). "I think that the biggest challenges that we have is that there are different time zones and stuff, you know" (USA, O2, 16, 00:32:07).	The statement has to indicate an influence on the shared context by some factor or circumstance not fitting into C1.3.1 – C1.1.5. The quote can either be a direct observation, from the respondent, or it can also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to the appropriate subcategory of C1.2 depending on the respective medium.
Category Building shared identity (C2) – Social interactions (C2.1)			
Hallway (C2.1.1)	Two or more team members engage in social interaction at the office in the hallway, e.g. on their way in, or to someone's desk.	"Wenn man sich am Gang trifft oder so wird natürlich auch […] kurz geplaudert" (AT, O1, 1, 00:11:49). "I might meet somebody on the, you know corridor. I might talk about a ball game, or whatever it is" (USA, O2, 19, 00:04:50).	The statement describes a face-to-face meeting at the office in the hallway or at someone's desk between two or more team members. It can be a spontaneous, or an arranged meeting. Since the meeting took place face-to-face an additional paraphrase has to be added to C2.2.1.
Lunch / coffee break (C2.1.2)	Two or more team members engage in social interaction at lunch or at a coffee break.	"Normalerweise nach dem Mittagessen gehen wir gemeinsam auf einen Kaffee. Das heißt der eine sagt: 'Coffee break'. Sozusagen. Dann gehen wir gemeinsam auf einen Kaffee. Dann stehen wir in der Küche und dann werden in der Regel – also versucht man natürlich nicht nur über die Arbeit zu reden sondern auch über andere Dinge" (AT, O1, 2, 00:05:59). "I mean we go for lunches sometimes, and other than that we don't do that much together" (USA, O1, 15, 00:21:20).	The statement describes a face-to-face meeting at lunch or for coffee between two or more team members. It can be a spontaneous, or arranged meeting. If the lunch or coffee break took place at a business trip, the statement has to be categorized as C2.1.5. Since the meeting took place face-to-face an additional paraphrase has to be added to C2.2.1.
Activities outside the office (C2.1.3)	Two or more team members engage in social interaction outside of the office, e.g. getting a beer after work or doing sports together.	"Und dann natürlich vor den Weihnachtstagen hat es auch einmal gegeben, dass wir gemeinsam zum Punsch trinken gegangen sind, am Karlsplatz. Und ahh ja, wird hoffentlich in Zukunft noch häufiger vorkommen" (AT, O1, 4, 00:07:53). "Also ab und zu machen wir halt so Inoffizielles – also einfach das – das ganze Team, dass wir irgendwo essen gehen, oder auf ein Getränk am Abend, oder... Ja das kommt ein paar mal vor. Ja" (AT, O2, 6, 00:14:41).	The statement describes a meeting somewhere outside the office where two or more team members spend time together and engage in social interaction. It can be a spontaneous, or arranged meeting. If the activity took place at a business trip, the statement has to be categorized as C2.1.5. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C2.2.2, or C2.2.3 depending on the respective medium.

Organized events (C2.1.4)	Multiple team members engage in social interaction at organized events, which can take place at the office or a different location, e.g. Restaurant, Bar, etc.	"Ja, ist leider zu selten, aber doch. Ahm wir haben ahhh öfters so Teamabende wo wir zum Beispiel Bowlen gehen – Bowling spielen gehen. Und ahm Ja da ist natürlich auch immer. […] Das ist das gesamte Team. Also das ist wirklich komplett organisiert, so dass jeder dabei ist" (AT, O2, 9, 00:08:08). "But no, I think to my boss's credit – we do team social events sometimes, in addition to you know, those are more top down – hey we are going to do this thing. And that does go out to everybody. There would be a more bottom-up thing, like: hey let's go grab a drink, kind of thing. No, we did laser tech a couple of times, as a team. And he made it even more fun by challenging a different team. That was really nice" (USA, O1, 12, 00:40:27).	The statement describes an organized event where multiple team members meet and engage in social interaction. It has to be an arranged meeting, initiated by someone in a leadership position. If the event took place on a business trip the statement has to be categorized as C2.1.5. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C2.2.2, or C2.2.3 depending on the respective medium.
Business trips (C2.1.5)	Two or more people engage in social interaction on a business trip.	"The only thing – time – we have spend time outside of here is probably if I'm going to Germany with one other colleague in the team. Right. So we tend to spend a whole week going to dinners, bars whatever so we get to know as much – otherwise we go back to the families" (USA, O1, 15, 00:21:20). "We all have had things were we have gone, you know, on ahh – travel for work together. Gone to Vienna, been there for a week or two, ahm gone to ahm user conference. So we have, you know – that is – that is a time where there is a lot of social interaction. Because you are in another country and you are with your coworkers. You are going out for dinner and that kind of stuff" (USA, O2, 16, 00:24:03).	The statement describes a business trip during which two or more team members spend time together. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C2.2.2, or C2.2.3 depending on the respective medium.
Category Building shared identity (C2) – Communication tools (C2.2)		
Face-to-face (C2.2.1)	Face-to-face communication is used in a situation regarding shared identity.	"Über Telefon wäre dann eben dieses gemeinschaftliche, und das visuelle nicht so da gewesen, dass man eben immer wieder die Vorschläge vor sich gesehen hätte, also das – das hätte dann eben irgendwie über -über einen shared Desktop funktionieren müssen wo dann jeder aufmalt, irgendwelche Grafiken, aber das hätte auch viel länger gedauert als wie wenn man es einfach auf die Tafel malt. Ja natürlich wäre es dann möglich über – über Webcams, oder so irgendwie eine Videokommunikation zu machen, aber da hätte dann wirklich das gemeinschaftliche Erlebnis gefehlt" (AT, O1, 4, 00:21:28).	Whenever a quote is assigned to C2.1 or C2.3 a paraphrase will be added to this category, if the usage of Face-to-face communication is mentioned. Either the usage of Face-to-face communication is directly mentioned, implied, or it is explained in which situations it is used and whether or not it is helpful.
Instant messaging (C2.2.2)	An instant messaging tool is used in a situation regarding the shared identity.	"Mhhh, ja kontaktieren wir uns halt kurzfristig: was machst du zum Essen? Meistens über dieses Chatprogramm" (AT, O2, 10, 00:06:07).	Whenever a quote is assigned to C2.1 or C2.3 a paraphrase will be added to this category, if the usage of an instant messaging tool is mentioned. Either an instant messaging tool is directly mentioned, implied, or it is explained in which situations it is used and whether or not it is helpful.

Synchronous multipurpose media (C2.2.3)	A synchronous multipurpose media tool is used in a situation regarding the shared identity.	"Ja also zum Beispiel bei diesen ähh Live Meetings ist es so, dass man meistens bis sich alle eingewählt haben plaudert man halt kurz. „Wie gehts?" Manche sind in München die meisten sitzen ja irgendwo anders. Dann wird ein bisschen geplaudert. Aber dann eigentlich schon fokussiert" (AT, O1, 1, 00:11:49).	Whenever a quote is assigned to C2.1 or C2.3 a paraphrase will be added to this category, if the usage of a synchronous multipurpose media tool is mentioned. Either a synchronous multipurpose media tool is directly mentioned, implied, or it is explained in which situations it is used and if it is helpful or not.
Category Shared identity (C2) – Context factors (C2.3)			
To know each other (C2.3.1)	Clear influence on the team feeling, the *we-ness* or the feeling towards individual members of the team because they know each other.	"And – and they did something very smart in my view: they brought them all on a sight for a while so we could all meet. Ahm and really at a very expense frankly, I mean, there were all this people and they had hotels, and you know all the travels and stuff and it was an order of weeks or maybe even months which is a lot, for a lot of people. Ahm and we were all in the same place, so we were all in a small room, or – or in the same building at least. And then, we knew each other and then, you know, when we work apart then I can just be a little less formal about asking for something, or like, you know, just like: hey, you know like: hey, what's up. Or like: hey how are you. There is no, like – you know – there is no ahm certain hesitation or it is you have some reward, is the word really, where you feel comfortable talking to them. I think that goes a long way" (USA, O1, 12, 00:29:25).	The statement has to indicate an influence on the shared identity by spending time with one, or more team members. The quote can either be a direct observation from the respondent where she or he explicitly says how knowing each other influences the shared identity, but it can also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C2.2.2, or C2.2.3 depending on the respective medium.
Personal attitude (C2.3.2)	Clear influence on the team feeling, the *we-ness* or the feeling towards individual members of the team by the personal attitude of the team members.	"I try to keep in mind that what one says has an impact on other people, you know. And if you come in with a negative attitude then it rubs of. Or it may resolves in people just not wanting to be involved with you" (USA, O1, 13, 00:07:35). "Die sind so herzlich und offen, da ist es beim ersten Workshop so gewesen, dass man das Gefühl hat man ist Teil vom Team, aber das ist halt auch ein kleineres Team. Und ja – das ist sicherlich auch ein bisschen eine Charaktersache" (AT, O1, 1, 00:23:01).	The statement has to indicate an influence on the shared identity by the personal attitude of one or more team members. The quote can either be a direct observation from the respondent where she or he explicitly says how personal attitude influenced the shared identity, but it can also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C2.2.2, or C2.2.3 depending on the respective medium.

Open communication environment (C2.3.3)	Clear influence on the team feeling, the *we-ness* or the feeling towards individual members of the team by an open communication environment. The open communication environment is either explicitly agreed upon or naturally developed in the team.	"Das ist auch eine von den Sachen, was agil, was Scrum vorschreibt, dass alle auf der selben Ebene sind, auch wenn der Manager dort auch sitzt, oder Teamleader – dass die Kommunikation ganz auf der selben Ebene ist. Also das heißt ich kann sagen was mich stört und was mich nicht stört und was mir gefällt, und nicht. Ich kann meine Meinung einbringen ohne Hemmung" (AT, O2, 7, 00:28:47). "In a Standup meeting an issue will come up and I throw out a – a command like *ahm*: Maybe we could think of doing it this way, because blablabla. And then someone else will say: Well I have heard that it is not so great. Or I think that is a great idea. Or that is – that is a spontaneous communication and that is a good reason they have Standup meetings" (USA, O2, 18, 00:06:58).	The statement has to indicate an influence on the shared identity in an open communication environment. The quote can either be a direct observation from the respondent where she or he explicitly says how the open communication environment influenced the shared identity, but it can also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C2.2.2, or C2.2.3 depending on the respective medium.
Shared context (C2.3.4)	Clear influence on the team feeling, the *we-ness* or the feeling towards individual members of the team by the shared context. Shared context exists because of common work, a common goal or physical surroundings.	"Ahh I guess right now I feel like we are still a bunch of people that are in the same department, but kind of disconnected, but again we are not working on one project together" (USA, O1, 14, 00:15:24). "So it is like, we all work towards a common goal. *Ahh* so I think that there is – you have that sense of – of teamwork and a joined responsibility and a joined accomplishment. And that is probably the time where you are most connected" (USA, O2, 16, 00:28:44).	The statement has to indicate an influence on the shared identity by the shared context. The quote can either be a direct observation from the respondent where she or he explicitly states how the shared context influenced the shared identity. However it can also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C2.2.2, or C2.2.3 depending on the respective medium.
Others (C2.3.5)	Clear influence on the team feeling, the *we-ness* or the feeling towards individual members of the team by a factor or circumstance not fitting into C1.3.1 – C1.3.4.	"Da merkt man schon mal, dass – dass es nicht so schnell locker wird, wie wenn man von vornherein so sprechen kann wie man spricht [Muttersparche]" (AT, O1, 1, 00:23:45). "Ahm because, you know, it is an open concept. And you do see people more often, so like I wanted to chat with that person, you know whatever – could be work related could be not" (USA, O1, 12, 00:13:35).	The statement has to indicate an influence on the shared identity by some factor or situation not fitting into C2.3.1 – C2.3.4. The quote can either be a direct observation from the respondent, but it can also be implicit. If the use of a communication tool is mentioned a paraphrase has to be added to C2.2.1, C2.2.2, or C2.2.3 depending on the respective medium.